

120
km/h

Services
1000 m

M1
The NORTH
Sheffield 51 km
Leeds 94 km

Metric signs ahead

A report by the *UK metric association*

m

Metric signs ahead

The case for converting road signs to metric units

(with 2009 update)

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Foreword by Lord Kinnock of Bedwelty

40 years after Britain first started to go officially metric, there is one important area in which we are still living in the imperial past. We see this in the muddle of measurement units in use in the United Kingdom. Our road signs are a perhaps the most obvious example and they contradict the image - and the reality – of our country as a modern, multicultural, dynamic place

where the past is valued and respected and the future is approached with creativity and confidence.

Of course, it is not just a question of Britain's image. The persistence of miles, yards, feet and inches on road signs is a continuing obstacle to people being able to "think metric" in other areas of life - from shopping to health and safety, from DIY to calculating their petrol consumption or understanding the weather forecast.

It is obvious that every country needs a single system of weights and measures which people of all ages, backgrounds and origins, can understand and use and it is equally clear that nobody needs two systems. For the younger generations who have full command of metric measurement as a result of their schooling, the continuation of the imperial system is confusing as well as quaint. For older people like me, a reasonable transition period would minimise the difficulties of change.

It is widely believed – largely because of distortive press coverage - that weights and measures policy is primarily a European issue. It is not. In the ten years that I was a European Commissioner (including five years with the Transport portfolio), I know that there was no pressure from the Commission on any British Government to convert UK road signs. Indeed, the EU agreed many years ago that the United Kingdom and Ireland should set their own timetables for phasing out the remaining imperial measures. The issue is therefore entirely a matter for the British Government and Parliament.

Sadly, the truth is that, although most senior politicians are well aware that the current dual system has serious practical disadvantages, successive British Governments have been reluctant to take responsibility for bringing the excruciatingly slow metric changeover to a decisive conclusion. It was originally intended to convert British road signs in 1973, but the change was postponed and then never re-instated. A third of a century later this booklet argues convincingly that the time has come to get up to date and complete the conversion process. It briefly traces the history of how we got into the present condition and why it is in the national interests of the United Kingdom to sort it out as soon as possible – and the booklet also demonstrates the fact that the changeover can be made economically and safely if a practical recommended timetable is followed.

I therefore endorse this publication as a valuable source of rational information for Government, industry, the professions that will need to carry out its recommendations, and the general public. If the arguments are understood and accepted, Britain can join the modern metric World – and do it by the time that the all-metric Olympic Games open in London in 2012.

Neil Kinnock

Executive Summary

- The purpose of this report by the UK Metric Association (UKMA) is to demonstrate to the key players in Britain's road system – including Ministers, their civil servants at the Department for Transport (DfT), road builders, professional bodies, car manufacturers and motoring and road safety organisations that **it is in the national interest to fix a date for the adoption of metric road signage, and that this date should be as soon as practicable** (paragraphs 1.1 - 1.4).
- **Britain's road signage is a special case of the confusing muddle of measurement units which we have described elsewhere (UKMA, 2004) as "a very British mess"**. This muddle has resulted from the failure of successive British Governments to carry through the policy, announced in 1965, of converting to the metric system as the primary and eventually the only measurement system to be used in the UK (2.1 - 2.4).
- **Britain is unique amongst advanced countries in not permitting metric units (metres and kilometres) on almost any traffic signs.** Although it was planned to convert signage in 1973, this plan was postponed and has never been reinstated (3.1 - 3.11).
- The primary and overriding reason for extending the process of metric conversion to road signage is that **it will enable the UK at last to enjoy a single system of measurement which is understood and used by everyone for all purposes** - thus making it unnecessary for British people to be fluent with two very different and incompatible systems of measurement (4.1 - 4.6).
- A second reason is that **it would provide drivers with consistent information** in one single, easy system of units (4.7 - 4.20)
- Thirdly, a single set of units would be efficient for **mapmakers, surveyors, engineers, motor manufacturers and contractors** who build and maintain the UK's road infrastructure (4.21 - 4.24).
- Furthermore, there are **many other reasons** why it would be beneficial to complete the changeover as soon as possible, including:
 - It would possible easily to calculate fuel consumption and engine efficiency (4.26 -4.27)
 - Speed limits could be reviewed and adjusted more sensitively according to local road conditions (4.28 - 4.29)
 - Drivers visiting the UK could drive more safely (4.30 - 4.34)
 - Signposting would be compatible with Ordnance Survey maps (4.35 - 4.38)
 - Britain could fulfil its obligation under European law (4.39 - 4.40)

- The **DfT's main argument** for delaying the changeover - that it would be "confusing" for older drivers - **is shown to be invalid** (5.2 - 5.9). **The changeover could be carried out economically and safely within three to five years**, observing the following principles:
 - There should, as far as possible, be a "clean break" with imperial measures. There should be no question of dual unit signage (5.10 - 5.14)
 - Speed limit signage will need to be changed very rapidly (5.15 - 5.19)
 - Distance signage could, for reasons of economy, be spread over a longer period (5.20 - 5.21)
 - The precise method of conversion and the design of signage will need to be determined based on the experience of other countries such as Australia, Canada and the Irish Republic, but there will be no need to change "heritage" signage (5.22 - 5.35).
- **The costs of conversion are not a serious obstacle to change. We estimate that, if spread over a five year implementation period, the annual average costs would represent 0.27% of annual roads expenditure** - made up as follows (6.2 - 6.3):
 - Our "most probable" estimate of the cost of converting **speed limit signage** is **£20 million**, which would need to be met within a 12 month period (but possibly split between two financial years) (6.4 - 6.16 and Table 2)
 - The cost of converting **distance signage** will depend on the extent to which it can be spread over a longer period and absorbed within annual maintenance/replacement costs. Assuming a five year changeover period, the "most probable" estimate is **£60 million** (6.17 - 6.24)

This total "most probable" one-off cost of ca. **£80 million** (spread over several years) can be compared with annual **UK roads expenditure of £6 billion** (6.25 - 6.29 and Table 3)
- The experience of Ireland in 2005 (and of Australia and Canada in the 1970s) has shown that **the changeover can be carried out safely**. Any anticipated problems with speed limit signage can be dealt with by an intensive campaign of driver education. The change also gives an opportunity to review local speed limits - with additional benefits for road safety (6.30 - 6.45)
- **A practical, costed five-year plan** is proposed (7.1 - 7.21 and Table 4)
- UKMA believes that, **given full and rapid commitment from the Government, the confusing anomaly of imperial road signage could be ended within three to five years**. This would thus at last remove the biggest obstacle to Britain enjoying the benefit of a single, rational and easy system of measurement which is understood and used by everybody for all purposes (8.1 - 8.4)

1 Introduction

Purpose of the report

1.1. The purpose of this report is to demonstrate to the key players in Britain's road system – including Ministers, their civil servants at the Department for Transport (DfT), road builders, professional bodies, car manufacturers and motoring and road safety organisations - that it is in the national interest to fix a date for the adoption of metric road signage, and that this date should be as soon as practicable.

1.2. The authors of the report are the UK Metric Association (UKMA), an independent, non-party political, single issue organisation which advocates the full adoption of the international metric system (“Système International”) for all official, trade, legal, contractual and other purposes in the United Kingdom as soon as practicable. UKMA is financed entirely by membership subscriptions and by personal donations.

1.3. The report originated as a follow-up to correspondence which UKMA had with the Permanent Secretary of the DfT, David Rowlands, in 2003. The original intention had been simply to present the DfT with the overwhelming case for converting to metric road signage. However, it was felt that rather than pursue the correspondence in private with a senior civil servant, it would be more effective to make the case to a wider audience, including not only politicians but indeed all organisations which have an interest in Britain's roads - as well as releasing the report to the media.

1.4. The report draws on the experience of other countries which have successfully converted to metric road signage. In particular we cite the recent Irish changeover to metric speed limits, which took place on 20 January 2005.

Not only are the road signs themselves a muddle of metric and imperial units, but the retention of imperial units on these very prominent and highly important signs is a major disincentive to people to become familiar with metric units in other walks of life

2 Background of the “very British mess”

2.1. The British failure to adopt metric units for road signage and speed limits is a special case of what UKMA has described elsewhere (2004) as “a very British mess”. This mess consists of trying to use two incompatible systems of measurement in a single country at the same time – some people using one system, other people using the other system, some mixing both systems interchangeably, some being fluent in one system but uncertain in the other, many being fluent in neither.

2.2. Many British people and institutions appear to be unaware of the mess - either denying its existence or believing that it does not matter. Yet the mess results in misunderstandings, mistakes, accidents and incomprehension, undermining consumer protection and wasting much of our children’s metric education. It may also be a factor in the lack of numeracy in the general population.

2.3. The primary responsibility for the mess lies with successive British governments who have lacked the commitment and political courage to carry through a necessary reform (begun as long ago as 1965) in a decisive and co-ordinated manner or to explain why the change is in the national interest. The result has been that opponents of change have been able to exploit fears of the unknown and misrepresent metrication as though it were a foreign imposition or somehow a denial of civil liberties.

2.4. Road signage is a prime example of this mess. Not only are the road signs themselves a muddle of metric and imperial units, but the retention of imperial units on these very prominent and highly important

signs is a major disincentive to people to become familiar with metric units in other walks of life. Thus, for example, as most car drivers and passengers are familiar with distances in miles, much of the media feel it necessary to use miles in news reporting – even converting foreign news stories when the original reports are in kilometres. Similarly, the continued use of miles per hour (mph) on speed limits signs makes it difficult for weather forecasters to give wind speeds in the units in which the raw data is recorded – namely, metres per second (m/s) (normally expressed as the more familiar multiple, kilometres per hour (km/h)).

3.5. However, on 24 May 1965, the President of the Board of Trade announced to the House of Commons that, in response to a request from British industry, the UK was to convert to the metric system – with a target date of 1975. Initial progress was slow, and in 1968 the Minister of Technology appointed an advisory Metrication Board to co-ordinate and lead the process of changeover.

Contrary to the widely believed misrepresentation there has been little or no pressure from the EU to "fix this date".

3.6. Although transport and traffic signage were not included in the Minister's original announcement (they were outside his Trade brief), research at the National Archives has shown that some preparation for converting traffic signage was made within the Ministry of Transport (Paice, 2005). The documents released indicate that at that time Ministry officials viewed metrication as a national project from which they could not stand aside. However, although 1973 was set as the target year for converting road signs, little progress appears to have been made with these preparations before they were overtaken by the 1970 General Election, which resulted in a change of Government.

3.7. The new Government undertook a general review of the metrication project across all Departments and decided to continue with it. However, Transport Ministry officials were concerned that the 1973 target for converting road signs was unrealistic and recommended to Ministers that it should be postponed. This advice was gratefully received as it provided a welcome pretext for defusing a political problem - namely, growing criticism from a number of individual backbenchers within the governing party. As a result, the 1973 target was postponed, and no new date was set.

3.8. This account is borne out by the 1972 White Paper on Metrication, (DTI, 1972, paragraph 107), which refers to the statement made by the Minister for Transport Industries that "the Government had no alternative date in mind". The White Paper continued: "The change of speed and distance signs to metric units will need to be considered in detail, but not for some years". Thus, although other sectors of the economy continued with the changeover, traffic signage remained imperial.

3.9. In 1973, the UK became a member of the European Economic Community, which had already agreed in principle that, with limited exceptions such as aviation and marine navigation, the only measurement system to be used within the Community should be the International System of Units (SI) – otherwise known as the metric system. However, it was agreed that the UK and Ireland should have derogations with long transition periods to allow those states to complete their metrication programmes at their own pace. In 1980 and again in 1989, these derogations were renegotiated, and it was agreed that the UK and Ireland should be permitted to fix their own dates for the conversion of traffic signage. Contrary to the widely believed misrepresentation, there has been little or no pressure from the EU to "fix this date".

Far from “fixing a date” for conversion ... , the UK government has sought reasons for postponing the change

3.10. Since 1989 there has been little progress. Far from “fixing a date” for conversion (as required by the EU Directive), the UK government has sought reasons for postponing the change, invoking in particular the specious and implausible argument that such a change would be “confusing” for drivers who have not received a metric education at school (Hansard, 2002). The only concessions to metric signage have been to permit (but not require) prohibition signs for vehicle height and width to be in both metric and imperial units, and separate (triangular) warning signs to be erected in metric units alongside an imperial sign.

3.11. A brief summary of the main provisions of the relevant UK and EU law is given in Appendix B.

4 Why convert road signage?

4.1. In this chapter we explain why it is in the national interest that the UK should, as soon as practicable, convert its speed limits and traffic signage to metric units. In doing so we refute that view that traffic signage can be a “stand alone” system independent of the rest of society

A single, easy system

4.2. The primary and overriding reason for extending the process of metric conversion to road signage is that it will enable the UK at last to enjoy a single system of measurement which is understood and used by everyone for all purposes - thus making it unnecessary for British people to be fluent with two very different and incompatible systems of measurement.

4.3. One of the great strengths of the metric system is that it is indeed a proper system – that is, its components are all inter-related in a logical, coherent and consistent way, rather than being an incoherent collection of inconsistently related units which have survived by chance from medieval or Roman times.

4.4. As long as road signage and speed limits remain imperial, it will be difficult for many people to shed the habit of thinking of distances in terms of miles, yards, feet and inches or of speeds in terms of miles per hour. This lack of facility to think in terms of metres, kilometres and kilometres per hour then spills over to other walks of life. Weather forecasters feel obliged to translate windspeeds from metres per second or kilometres per hour to the more familiar miles per hour. Journalists, fearing that their readers will not understand metres, feel bound to translate foreign news stories from metres to feet. DIY shops and garden centres feel bound to give product descriptions and instructions in feet and inches. Publishers of road maps and atlases fail to take full advantage of the kilometre-based National Grid for identifying locations.

4.5. As long as our road signage stands out as an imperial anomaly, many people will have difficulty in making the change in other fields and in “thinking metric”. It is therefore essential to the achievement of the metric changeover in other fields (such as news reporting, weather forecasting, advertising, product description and maps and atlases) that road signage is brought into line. It is untenable that it can continue to be a “stand alone” system.

4.6. Moreover, apart from this overarching reason for bringing road signage into conformity with the rest of the country’s official measurement system, there are a number of practical arguments for making the change.

The primary and overriding reason for extending the process of metric conversion to road signage is that it will enable the UK at last to enjoy a single system of measurement which is understood and used by everyone for all purposes

... not only is the Highway Code itself a muddle of imperial and metric units, but it is also incompatible in some respects with road signage

Consistent information for drivers

4.7. Drivers need to have a variety of information in order to drive safely. They need to have background information which they have at the back of their minds at all times, and they also need to be able to absorb new information - often of a safety-critical nature - very rapidly or even instantly. Examples are given below:

- The rules of the road (from legislation and the Highway Code)
- Vehicle dimensions (from the manufacturer's manual)
- Vehicle laden and unladen weight (from the manufacturer's manual and weighbridge measurement)
- Height, width, length and weight restrictions (from road signs)
- Vehicle speed (from the vehicle's speedometer)
- Speed limits (from road signs and legislation)
- Stopping distances (from the Highway Code)
- Distances indicated to hazards or places (from road signs)
- Visibility reports (from radio weather reports and warning signs)
- Distance travelled (from the vehicle's odometer or trip meter)
- Location of accidents or other incidents (from temporary emergency road signs or radio reports)

4.8. It is obviously desirable that this important information is available in consistent and compatible forms. Yet in the UK this is far from being the case, as the following examples and the accompanying diagrams show.

Compatibility with the Highway Code

4.9. The Highway Code is a key document for road safety, and also enjoys a certain legal status: failure to comply with it "may be used in evidence in any court proceedings under the Traffic Acts to establish liability" (Driving Standards Agency, 2004). It is quite extraordinary therefore that not only is the Code itself a muddle of imperial and metric units, but it is also incompatible in some respects with road signage.

4.10. Figures 2(a) and 2(b) illustrate this muddle. Speeds are given in miles per hour, whereas the primary unit given for stopping distances is metres (with a supplementary indication in feet). Presumably in an effort to be helpful, this is then translated into "car lengths" - assumed to be an average of 4 metres.

4.11. To make matters worse, neither metres nor feet are authorised by the Traffic Signs Regulations and General Directions 2002 to indicate distances. On the contrary, signage for distances (as opposed to lengths, widths and heights) must be exclusively in yards, miles or fractions of a mile, which are then sometimes confusingly abbreviated to "m" (the correct symbol for "metre"). It is therefore not possible to relate

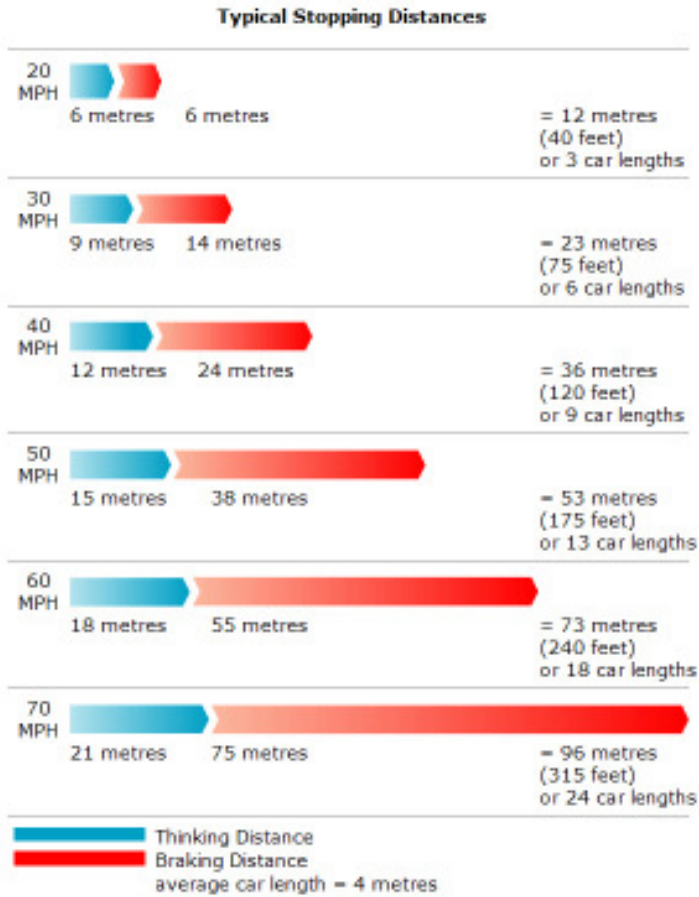


Figure 2(a): Typical stopping distances

The Highway Code gives speeds in miles per hour, stopping distances primarily in metres (with equivalent feet) and "car lengths" ...

Source: Highway Code (Driving Standards Agency)



Figure 2(b): Typical warning sign indicating distance

... yet Regulations do not authorise either metres or feet but require road signs to display yards (or fractions of a mile)

Source: Traffic Signs Regulations and General Directions 2002

All these potentially serious problems ... could easily be resolved by standardising exclusively on metres, km and km/h - the units which for 30 years have been taught in Britain's schools

distances on traffic signs to the stopping distances illustrated in the Highway Code.

4.12. Confusion is compounded by the fact that many learner and inexperienced drivers are likely to be young (some still at school), and they will therefore not have been formally taught the imperial system. It is likely that the majority of young drivers (and indeed many older drivers aged under 45) will not know how many yards or feet are in a mile - let alone in a fraction of a mile.

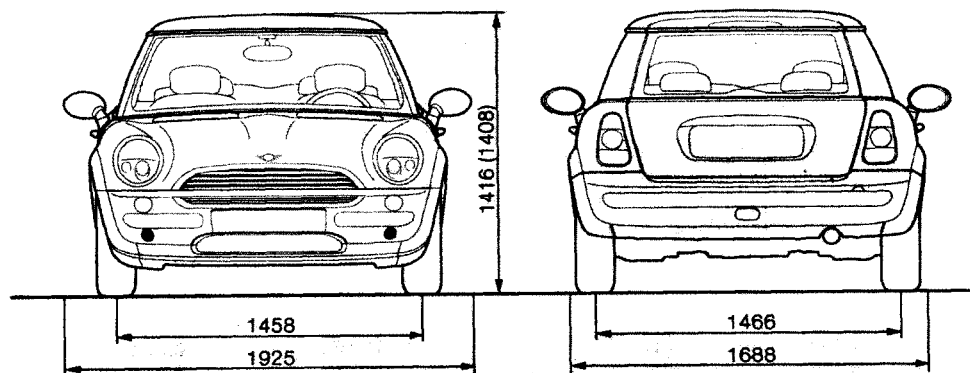
4.13. All these potentially serious problems are entirely unnecessary and avoidable. They could easily be resolved by standardising exclusively on metres, km and km/h - the units which for 30 years have been taught in Britain's schools.

4.14. It is, however, some comfort that metres are given pride of place in the Highway Code illustration, since for longer distances, they are much more likely to be a familiar unit than feet, if only because they have been familiarised by their importance in the athletics field. The forthcoming Olympic Games in London will reinforce that point.

Compatibility between vehicle manuals and road signage

4.15. Throughout the world, all modern road vehicles are manufactured to metric standards. Their dimensions are specified in metric units and they employ metric components. Product documentation and vehicle handbooks are metric. Thus, for example, a car manual will give dimensions in metres or millimetres. A typical example is shown at Figure 3. It is therefore natural that ferry companies should require drivers, when booking a ferry, to give the vehicle's height and length in metres.

Figure 3: Extract from a typical modern car manual, giving exclusively metric dimensions



4.16. By contrast, the Department for Transport requires that the primary information on vehicle height, width and length restriction and warning signs should be in feet and inches, as illustrated in Figure 4. Metric equivalents are permitted, as a supplement to the basic imperial information, but there is no requirement to provide them. Thus, drivers who obtain their information from the manufacturer's vehicle handbook and are confronted with an exclusively imperial restriction or warning sign are unable to judge whether their vehicle will negotiate the obstruction. Conversions between metres and feet and inches are non-trivial even with a calculator.

Accident and emergency incident location

4.17. A little known feature of British motorways is that, as elsewhere in Europe, they incorporate marker posts such as the one illustrated in Figure 5. These posts are spaced at 100 m intervals and include a reflector, an arrow pointing to the nearest roadside telephone and a location indicated in kilometres. This location is in fact the distance from a reference point such as the beginning of the motorway (or the Dartford Crossing in the case of the M25).

4.18. The purpose of these marker posts is to enable the site of an incident to be quickly and accurately located so that the emergency services can get help to the emergency as soon as possible. However, public ignorance of the meaning (or even the existence) of these important safety features seriously hampers their usefulness. As the Commission for Integrated Transport has commented (2002),

"Calls received via personal mobile phones, however, are not linked to any location referencing system that the emergency services are able to access. Therefore detailed information about the road and carriageway affected by the incident will have to be extracted from the caller."

"People often do not keep track of their location to the level of detail the emergency services require. ... The public is generally unaware of the road marker system - the Control Room often has to explain what the marker posts are to the caller so that the reference post can then be identified by the caller."

4.19. It is believed that public ignorance of the system is related to the fact that it is totally metric and hence is incompatible with the miles and yards to be found on official road signs. In effect we have two incompatible systems: one for professionals (the emergency services) and one for general road users.

4.20. UKMA contends that if road signage were converted, the emergency marker posts could form part of an integrated system, enabling drivers to be much more aware of their location and thus better able to respond to emergencies - to the benefit of road safety.

... public ignorance of the system (of emergency marker posts) is related to the fact that it is totally metric and hence is incompatible with the miles and yards to be found on official road signs

Figure 4: Width restriction

Regulations require width restriction signs to be imperial, with a "permitted variant" (not a requirement) of additional metric dimensions.

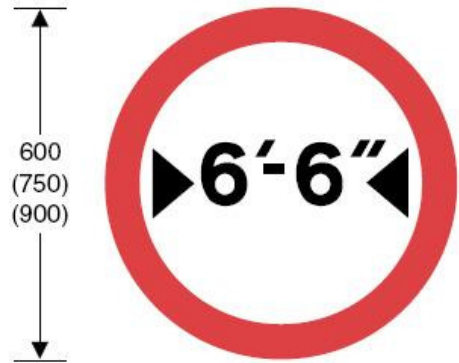


Figure 5: Marker post

These motorway marker posts indicate distances in kilometres and are used by emergency services to locate incidents. As they are incompatible with miles and yards on traffic signs, they are little known by the general public.

Consistency for industry

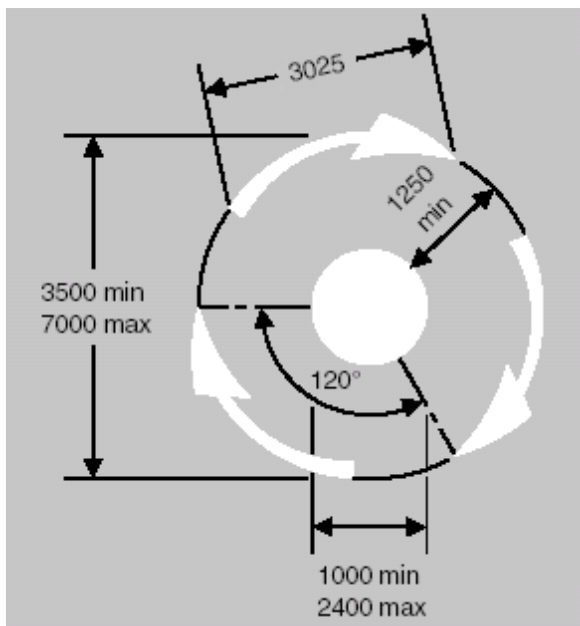
4.21. Much of British industry, including building, civil engineering and most manufacturing, converted in the 1970s to metric units for everyday use both internally and in commercial transactions such as supplying and tendering for contracts (including contracts for the Highway Agency).

4.22. We have seen that, with limited exceptions, British road signs display exclusively imperial units. It is quite ironic, therefore, that the detailed specification of the size, shape and positioning of such signs is wholly metric. Figure 6 is an example taken from the Department for Transport's manual of Traffic Signs. It illustrates that whereas the speed limit is shown in miles per hour, the size of the sign is specified in millimetres.

4.23. Similarly, roads themselves are designed and built wholly in metric dimensions (as can be seen from Figure 7). Yet contractors engaged in road construction, marking or maintenance are required to place warning signs giving distances in yards.

... roads themselves are designed and built wholly in metric dimensions ... Yet contractors engaged in road construction, marking or maintenance are required to place warning signs giving distances in yards

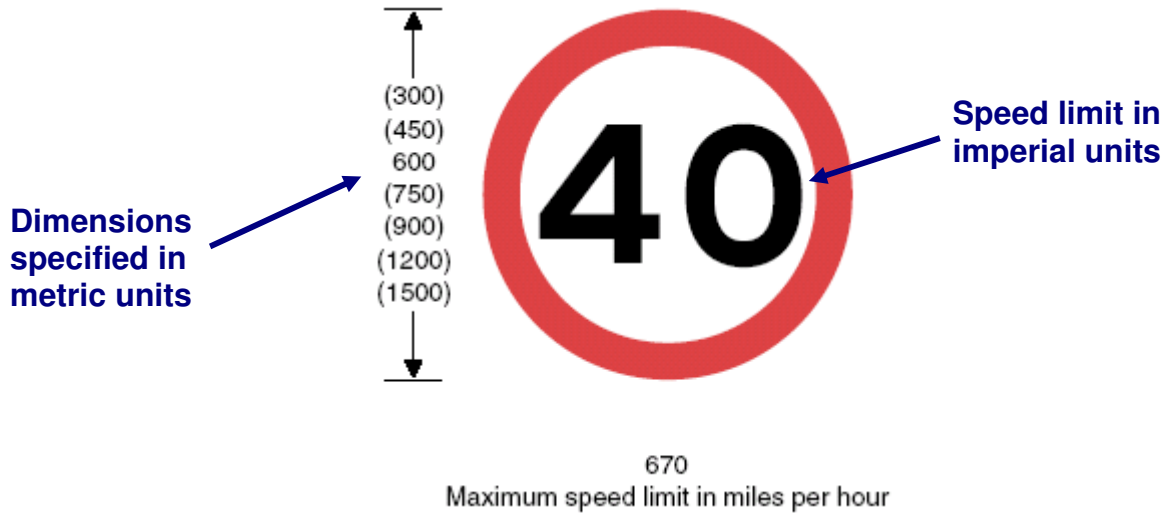
Figure 7: Specification for the road marking of a mini-roundabout (It is, of course, entirely metric)



Source: TSRGD Schedule 6 diagram 1003.4

4.24. We are aware of the argument that these inconsistencies do not matter since the different measurement units are aimed at different audiences: metric for professional engineers, contractors and sign-

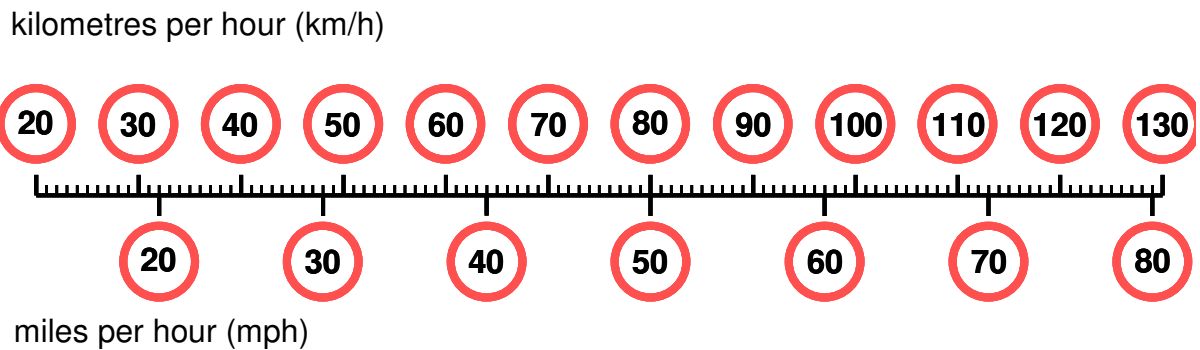
Figure 6: Example of mixed units: metric for sign-makers but imperial for the general public



Source: TSRGD Schedule 2, Diagram 670

Figure 8: Comparison of km/h and mph speed limits

km/h speed limits give a wider range of choice and hence are more sensitive to local safety needs than mph



Source: UKMA

makers (who can be expected to understand metric units) and the more familiar imperial for the general road user. We reject this argument as we feel that it patronises the general public. British road users are potentially just as capable of understanding metres, km and km/h as are road users in other countries. Furthermore it is wasteful that contractors are forced to work in both metric and imperial. There is no valid reason for maintaining two systems where one would suffice.

Other reasons for conversion

4.25. A number of other reasons for change deserve a mention:

- (a) Calculating fuel consumption and engine efficiency
- (b) More sensitive speed limits
- (c) International trade and tourist visitors driving in the UK
- (d) Signposting and Ordnance Survey Maps
- (e) Legal requirement under EU law

These other reasons are discussed below.

Calculating fuel consumption and engine efficiency

4.26. One of the most infuriating anomalies of the British imperial/metric muddle is that since the early 1980s it has no longer been possible to do quick and simple calculations of fuel consumption or engine efficiency. This is because fuel is sold by the litre whereas distance is quoted in miles. Thus neither the imperial calculation of engine efficiency (“miles per gallon” - or mpg) nor the metric calculation of fuel consumption (litres per 100 kilometres – or L/100 km) can be carried out without the additional step of converting either miles to kilometres or litres to gallons. Moreover since the relationship between the two measures is inverse, there can be no simple conversion factor between L/100 km and mpg.

4.27. In a rational world, both elements in the calculation would be in the same system. Unfortunately, this is not the position in the UK, thus making it difficult for motorists to calculate the cost of a journey or check their fuel consumption with the figures claimed by car manufacturers.

More sensitive speed limits

4.28. It is well established that excessive vehicle speed is a major factor in deaths and serious injuries to pedestrians. For example, according to the Royal Society for the Prevention of Accidents (RoSPA, 2005), 90% of pedestrians will survive being hit by a car travelling at 20 mph (32 km/h), half of pedestrians will be killed if hit by a car at 30 mph (48 km/h), and 90% of pedestrians will be killed if hit by a car at 40 mph (64 km/h).

4.29. Figure 8 illustrates that if km/h rather than mph speed limits are used, there are more options available (e.g. within the critical range 30 - 70 km/h, there are five metric but only three imperial options). While we

... since the early 1980s it has no longer been possible to do quick and simple calculations of fuel consumption or engine efficiency. This is because fuel is sold by the litre whereas distance is quoted in miles

We could therefore be considering more than two million drivers annually on UK roads for whom much of our safety-critical road signage is meaningless

would not suggest a direct causal link between pedestrian casualties and the insensitivity of UK speed limits, it is clear that km/h speed limits are more capable of "fine tuning" to suit local traffic conditions, thus potentially improving road safety.

International trade and tourist visitors driving in the UK

4.30. Large numbers of foreign-based drivers (both professional and tourists) drive each year in the UK. Most of these (apart from American visitors who hire a car) will have been educated exclusively in metric units and will have little or no grasp of imperial units. Moreover, although such foreign drivers are expected to comply with miles per hour (mph) speed limits and other imperial regulations, foreign vehicles temporarily imported are not required to have mph on their speedometers. Distance signage in miles, yards and fractions of a mile is largely meaningless to foreign drivers, as are height, width and length restrictions in feet and inches.

4.31. While it is clear that, with practice, most drivers eventually adapt to driving using different units for signage and speed limits, there is no room for complacency. It is clearly not ideal to switch measurement units in mid journey on top of the challenge of driving on a different side of the road. This is potentially a particular problem in the border areas of Ireland (albeit without the added problem of driving on the other side of the road).

4.32. Accurate figures for the numbers of drivers involved are not available, but some idea of the scale of the problem may be gleaned from Table 3.5 of Maritime Statistics 2003 (DfT, 2004). This shows that in 2003 there were 5 213 000 arrivals and departures of accompanied cars at British ports, and a further 2 279 000 using the Channel Tunnel - a total of 7 492 000 car movements into and out of the UK (including to and from the Irish Republic). These crude figures need to be adjusted to allow for cars carrying more than one driver and for multiple journeys by the same drivers. Nevertheless, we think that these figures probably represent in excess of 4 million drivers annually (British and foreign) who now drive abroad in their own car. While it is likely that the majority of these will be British drivers travelling to the Continent, it is estimated that approximately a million of these will be foreign tourists and professional HGV drivers - many driving in the UK for the first time.

4.33. To the numbers of drivers venturing abroad in their own vehicle must be added an estimate of the number of tourist visitors who hire a car in the UK. Again there are no authoritative statistics available. However, Table 12.7 of Annual Abstract of Statistics 2005 (AAS) shows that in 2003 there were 24.7 million visitors to the UK (including those who travelled in their own vehicle). If, conservatively, we assume that only 5% of these hired a car, this would represent over a further million drivers who have to cope with unfamiliar road signage in the UK. We could therefore be considering more than two million drivers annually on UK roads for whom much of our safety-critical road signage is meaningless.

This represents a hazard to British drivers and pedestrians as well as to our visitors.

4.34. In 2012, London will stage a major all-metric event, the Olympic Games. This event is expected to attract millions of foreign tourists and to concentrate the attention of the world's media not only on the athletes taking part but also on the stadia, the transport systems and other infrastructure involved. Britain's image as a modern, progressive and multicultural country is likely to be seriously undermined if, by that time, we are still clinging to obsolete imperial signage for both vehicles and pedestrians.

Signposting and Ordnance Survey maps

4.35. The Traffic Signs Regulations and General Directions 2002 (the TSRGD) apply to traffic signage on all highways in England, Scotland and Wales, and parallel Regulations apply in Northern Ireland. It has long been held that a "highway" is any land over which the general public has the right to "pass and repass". This definition includes public footpaths and pedestrianised streets as well as roads used by vehicles (although it does not include roads and paths on private land to which the general public does not have right of access). The TSRGD does not authorise metric units on official distance signage on highways. Where local authorities and private bodies have erected informal signs displaying metric distances, these have sometimes suffered vandal damage by persons whom a judge has described as "imperial vigilantes" (BBC Online, 2002). Thus, the majority of signposts on public footpaths and within pedestrian streets in towns either display exclusively miles and yards or do not give distances at all, thus depriving pedestrians (especially foreign tourists) of useful information in navigating British cities, towns and countryside.

4.36. This continued adherence to imperial distance signage may be contrasted with the practice of the Government's principal map-maker, the Ordnance Survey, which is an agency of the Department of Defence. As long ago as 1939, the Ordnance Survey adopted the kilometre-based National Grid, which enables any location in Great Britain to be identified by a unique grid reference. Since 1970, when the 1:50 000 series of maps was introduced, all new map surveying and publishing by the Ordnance Survey has used metres for bench marks and contours, and kilometres and metres for distances.

4.37. Thus, although it is clearly desirable that signposting and mapping should use the same units of measurement, the insistence of the Department for Transport on maintaining imperial distance signage has ensured that Britain's maps and signposts are in conflict. While in most cases the inability of walkers to relate signposting to maps is merely an irritating inconvenience, there is potential for more serious consequences if the persistence of imperial signage leads people to pay less attention to

... although it is clearly desirable that signposting and mapping should use the same units of measurement, the insistence of the DfT on maintaining imperial distance signage has ensured that Britain's maps and signposts are in conflict

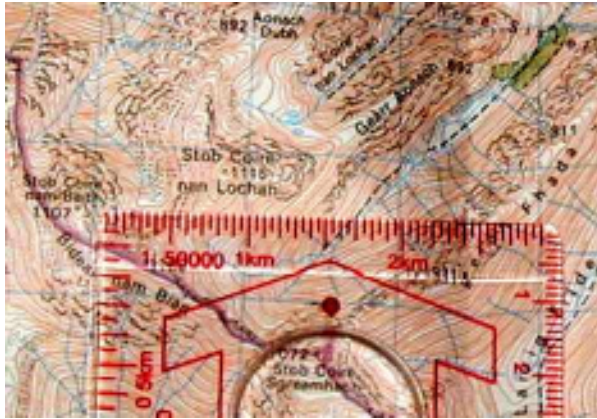


Figure 9 : Metric mapping

This shows the use of a compass and metric scale ruler with the OS 1:50 000 scale map. Unfortunately, this system is undermined by the DfT's insistence on imperial footpath signage



Figures 10 (above) and 11 (below): Inconsistent footpath signs

Walkers to Loch an Nostarie will find that the above sign fits well with their OS maps while walkers to Porthtowan will find the sign incompatible.



metric-based maps. Understanding the (metric) National Grid system is essential to navigating safely on mountains, moorland and coastal paths in poor visibility. These problems are illustrated graphically in Figures 9, 10 and 11.

4.38. A further damaging consequence of this conflict is that commercial publishers of road maps and atlases tend, by default, to give prominence to imperial measurements – even though these maps are based on the Ordnance Survey. The current editions of many of these maps and atlases continue to give distances exclusively in miles, sometimes show heights in feet and fail to make use of the National Grid (or where they do use the actual lines of grid, they use a different alphanumeric numbering system and do not indicate that one grid square equals one square kilometre). Most advertise the map scale as an incongruous relationship such as “4¼ inches to one mile” (A - Z Map Co Ltd, 1998) rather than a rational scale ratio (e.g. 1:10 000) which is easy to use and well understood in metric countries. All these problems are partly attributable to the failure to convert UK road signage to metric units.

Understanding the (metric) National Grid system is essential to navigating safely on mountains, moorland and coastal paths in poor visibility

Legal requirement under EU law

4.39. A further reason why the UK should adopt metric road signage as soon as practicable is that it has a legal obligation under European Union Directive 89/617/EEC (as amended) to do so. This Directive (which was of course agreed by the relevant British Minister in the Council of Ministers) allows the UK and Ireland to fix their own date for adopting metric road signage. It does not specify any time limit, but there is clearly a requirement that a date must be set.

4.40. UKMA does not see this as a primary reason for change: even if there were no such legal obligation, it would still be in the national interest to adopt the international system. Nevertheless, it is useful to record that the UK is probably in breach of the EU Directive which requires the Government to “fix a date” for changing our road signs.

Table 1: Some measurement units used in road transport infrastructure

Category	Measurement units used
Legal speed limits	mph
Official traffic signs (visible display)	mph for speed limits; miles and yards for distance signs; tonnes for weight limits; feet and inches for height, width and length signs (with optional accompanying metres)
Official traffic signs (specification for design and siting)	km, metres and mm
Motorway emergency markers	km and metres
Road design and construction	km, metres and mm
Petrol sales	litres
Official petrol consumption figures	L/100 km or mpg
Ordnance survey maps	metres and km
Commercial maps/atlasses	miles, yards and feet
Car manuals	metres and mm (Bar for tyre pressures)
Car dashboard instrument panels	mandatory mph, km/h and miles; optional mpg, km and L/100 km
Tyre pressure gauges at garages	either lb/in ² or Bar
Car ferry operators (incl Channel Tunnel)	metres
Tachographs	km and km/h
Parking regulations	metres
Severe weather warnings (e.g. visibility)	metres
Regulations on emissions	g/km
In-cab vehicle height indications	feet and inches
Signs on private roads, footpaths	not regulated, hence optional - either miles, yards, feet, inches; or metres and km
Roadside advertisements (excluding official traffic signs)	not regulated, hence optional - either miles, yards, feet, inches; or metres and km

5 Principles of change

5.1. We have argued in Chapter 4 that it is in the national interest that the UK should change to metric units on road signage as soon as practicable. In this chapter we set out some principles which we feel should govern this changeover.

When to make the change

5.2. The DfT have argued (unconvincingly and possibly disingenuously) that it would be “confusing” to make the change while a significant number of drivers had received no metric education at school (Hansard, 2002). The DfT’s argument appears to be that since metric units were not introduced into the school curriculum until 1974, there are still many older drivers who have no familiarity with metres and kilometres. The Department has used this argument as a reason for not fixing a date or making plans for the changeover.

5.3. UKMA considers that metric education at school is not a major factor in the decision whether or when to adopt metric road signage. If this were intended as a serious factor in the decision, then, as we have argued in paragraph 4.12 above, there would be concern about the lack of imperial education amongst younger drivers who are expected to cope with miles, yards, feet and inches despite not having had any formal instruction in those units. The Department’s case surely ignores the increasingly important fact that all adults who attended school in the last 30 years will have been educated in the metric and not the imperial system. The tragedy is that the value of this basic learning will continue to be eroded, so long as they are confronted with so many haphazard survivals of the imperial system. For them, as for the older generation, this confusion is not only destructive of the value of their education but obstructive of the learning process which could and should be encouraged for the dwindling older generation

5.4. However, the sad reality is that the 30 years of metric education in school has been rendered largely ineffective as it has been systematically undermined by the slow progress on metrication beyond the school gate. As a result much of the adult population, both young and old, has both a limited ability to think or work in metric units and a poor understanding of imperial.

5.5. Even if the DfT’s argument were valid, we are probably now at or very near the point where the majority of drivers *have* in fact received metric education at school. In order to test the validity and sincerity of the DfT’s argument, a number of questions were put to the Department in April 2005. They were asked to supply the following information:

- (a) estimates of the number of UK resident drivers who have and have not received education in metric units at various dates in the past and projections of such estimates for the next five years; and

The experience of other countries ... shows that the change can easily be made even though the majority of drivers have received no metric education ... Familiarity comes from use - not from education

(b) estimates of the numbers of UK resident drivers who have received no formal education in imperial units at various dates in the past and projections of such estimates for the next five years.

5.6. The DfT's response to these questions was revealing. In both cases the answer was: "We do not have such estimates." (Vernon, 2005). What this demonstrates is that the DfT has no evidence and hence no basis for their implausible argument.

5.7. Anyone who left school after 1974 – that is, anyone born after 1958 - would have received some metric instruction within the maths or science curriculum. We are not aware of authoritative figures on the age profile of drivers, but we would estimate that the number of drivers aged 17 – 47 may well exceed the number of drivers aged 48 or over. There can be no doubt that metric-educated drivers will be in the majority within the next two or three years, and the DfT should therefore already be making plans to fulfil its obligation to "fix a date" for adopting metric road signage.

5.8. The experience of other countries (e.g. Australia, Canada) shows that the change can easily be made even though the majority of drivers have received no metric education. As the Australian report (Wilks, 1992) commented, familiarity comes from use - not from education.

5.9. Thus, the DfT's arguments for continued delay do not stand up to examination. UKMA contends that there is no valid reason for further postponement, and that a national changeover plan should be launched as soon as possible. We estimate that, given the necessary commitment, and depending on the phasing of expenditure, this could be implemented within about three to five years – that is, by the end of 2010 at the latest, and possibly by the end of 2008.

Clean break

5.10. The British approach to metrication in other fields (especially retailing) has been one which we have described elsewhere (UKMA, 2004) as "voluntary gradualism" – that is, an approach characterised by long transitional or adjustment periods, extensive use of "supplementary indications" (i.e. giving both metric and imperial values on the same sign or label), and a lack of incentives to the general public to familiarise themselves with metric units and make the change.

5.11. While this approach was no doubt intended to make things easier and cushion the effects of change (and perhaps deflect political criticism), it has proved to be disastrous for the whole project of metric conversion. It has made the process excruciatingly slow, enabled much of society to ignore the change, and allowed opponents to spread misinformation and obstruct completion of the change.

5.12. The “voluntary, gradualism” approach can be contrasted with the highly successful “clean break” approach used when Britain adopted decimal currency in 1971. The change was compulsory, fast and effective.

5.13. Similarly, as the Institute of Highway Incorporated Engineers has pointed out on their website (2005), following the 1965 Warboys Report, which recommended the adoption of international symbolic signing rather than verbal signing (in accordance with the Vienna convention), much of the UK’s road signage was replaced safely and economically in the period 1965/6. There was then no question of postponing the change until a majority of motorists were familiar with the new signs.

5.14. Fortunately, as the adoption of metric road signage has scarcely begun, there is an opportunity to learn from these experiences and to carry out the conversion of road signage and speed limits in a competent manner. We believe that this means adopting the “clean break” principle, whereby the change is made in as short a time period as possible and without the use of supplementary indications.

there is an opportunity to ... carry out the conversion of road signage and speed limits in a competent manner. We believe that this means adopting the “clean break” principle

Speed limits – “overnight” change

5.15. For obvious safety reasons it is essential that there should be no confusion about whether a speed limit is denoted in mph or km/h. It follows therefore that any change must be very rapid – preferably overnight if that is practical, but certainly within a 2 - 3 day period. The experience of other countries indicates that, with proper planning, this can easily be done.

5.16. The change from imperial to metric speed limit signs also presents an opportunity to review the speed limits themselves, and, in preparation for the change, highway authorities, should be required to review speed limits and either confirm, raise or lower them as appropriate in the light of current road and traffic conditions.

5.17. Where no change can be justified, we would expect the default values to be as follows:

- 20 mph becomes 30 km/h
- 30 mph becomes 50 km/h (the default for urban areas)
- 50 mph becomes 80 km/h
- 60 mph becomes 100 km/h (the default for rural single carriageway roads)

5.18. The 40 mph limit would need to be either lowered to 60 km/h or raised to 70 km/h – depending on individual circumstances.

5.19. The default 70 mph national speed limit for rural dual carriageway roads and motorways could either be lowered to 110 km/h or raised to

A period during which distance signs are converted to kilometres while speed limit signs remain in mph would not present a significant safety problem

120 km/h. UKMA takes no view on this issue, but it is noted that some motoring organisations have been lobbying for a higher motorway speed limit, and it may be that the metric changeover will be more acceptable if it is accompanied by a general raising of this limit. (Figure 8 above illustrates the relationship between km/h and mph speed limits).

Distance signage

5.20. The safety arguments which support very rapid changeover of speed limit signage do not apply to distance signage. While it is obviously more convenient for distance signs and speed limit signs to be in corresponding metric units (i.e. km and km/h), a period during which distance signs are converted to kilometres while speed limit signs remain in mph would not present a significant safety problem.

5.21. Conversion of distance signage over several years would have the advantage that the cost could be spread and combined with the normal replacement of signs due to wear and tear.

Method of conversion

5.22. Countries which have adopted metric road signage have adopted different approaches to the actual physical conversion – as the following examples illustrate.

5.23. In Australia in the 1970s, new or replacement metric signs were installed alongside the existing imperial signs over an extended period but kept hooded until “M-day”, when the hoods were transferred from the metric to the imperial signs, which were later removed.

5.24. In Canada in 1977, extensive use was made of “decals” vinyl transfers which were fixed over the existing imperial signs so that they showed metric units. Speed limits were changed in this way over the Labor Day weekend.

5.25. In Ireland, the conversion of distance signs was carried out over more than 10 years by gradually replacing imperial signs with metric ones – priority being given to national roads and motorways. This conversion programme was legally required to be completed by the end of 2005. However, a total of 58 000 new or replacement speed limit signs were installed over a 3-day period in January 2005.

5.26. Each approach has its merits. The Australian programme was well planned and, while the preparation period was long, it resulted in an obvious clean break and immediate permanent signage on “M-day”. The Canadian approach was less permanent but had the merit of being a cheaper method of achieving an immediate effect. (Against this, it can be argued that the eventual replacement costs would make this approach more expensive in the long run). The Irish approach was economical and

very extended and attracted some criticism for the incompatibility of distance signs with speed limits.

5.27. Given the vulnerability of any conversion programme to political obstruction, it is desirable that the conversion of speed limit signage should be started, irreversibly committed and (preferably) completed within a short time period – say, three years.

5.28. Whatever solution is decided upon in principle, the details will need to be developed by experts working to a clear brief that emphasises the need for a quick and economical method of conversion.

Content and appearance of signage

Dual units

5.29. We have argued above (paragraphs 5.10 to 5.14) that, in accordance with the “clean break” principle, new signs should display a single unit only – that is, there should be no question of dual units on the same sign and no attempt to shield drivers from the need to make the small mental adjustment to metres, kilometres and km/h. The experience of dual pricing and quantity indication in retailing has demonstrated that “supplementary indications” (i.e. imperial equivalents of metric units) simply enable people to avoid the need for change and to continue to work in imperial measures.

5.30. This mistake must not be repeated in road signage.

5.31. Dual unit signs would also be more cluttered and less easy to read, with the risk of confusing drivers. In some cases this could present a safety problem - especially in relation to signing of speed limits.

5.32. On grounds of cost and visual appearance it is desirable that signs should be no larger than necessary. Clearly the incorporation of both metric and imperial units on the same sign must result in larger signs.

Distinguishing metric from imperial signs

5.33. We have argued above (paragraph 5.14) that, for obvious safety reasons, there must be no doubt about whether a speed limit sign is denoted in mph or km/h. It must be clearly understood on changeover day that henceforth all speed limits are to be read as meaning “kilometres per hour”. Nevertheless, we would recommend that, as a reminder to drivers, the symbol “km/h” should be included within the sign (as in Ireland).

5.34. During the period when, unavoidably, both metric and imperial distance signage is in use, it is desirable that the new metric signage should be instantly recognisable. We would suggest that this could be

Given the vulnerability of any conversion programme to political obstruction, it is desirable that the conversion of speed limit signage should be started, irreversibly committed and (preferably) completed within a short time period – say, three years

There is one category of distance signage which will not need to change

achieved by including the symbols "km" and "m" within the signs, and consideration could also be given to using different fonts and colours. (We are aware of the concern that there is some scope for mistaking the incorrect abbreviation "m" for miles for the correct symbol "m" for metres, but we feel that it will be clear from the context which is meant - e.g. "Road works 400 m".) We would, however, strongly recommend that the use of "m" for miles should be discontinued and prohibited with immediate effect.

Heritage signage

5.35. There is one category of distance signage which will **not** need to change. Many historic milestones and fingerposts survive from the early days of motoring (or indeed earlier), and some are even listed by the Department of Culture, Media and Sport as being of "architectural or historic interest" (DfT, 2005). These signs play no part in the modern signing of 21st century traffic, and they can safely be preserved as part of Britain's cultural heritage. Where new fingerposts of traditional design are introduced or reintroduced (for example, on unclassified roads in rural villages or Conservation Areas) there is no reason why distances should not be indicated in metres and kilometres.

6 Costs and safety

6.1. It is clearly important that the conversion of Britain's road signs to show metric distances and speed limits should be done economically and safely. In this chapter we show that this can easily be achieved.

Costs of conversion

6.2. UKMA does not believe that the cost of converting road signs need be a significant obstacle to the adoption of metric road signage. The experience of other countries (see Appendix A) has shown that with good planning and management, the cost can be comparatively modest - especially if compared with the total amount spent annually on building and maintaining roads. Unfortunately, the UK's Department of Transport (DfT) has been unable to provide up to date estimates of the cost, and we have therefore attempted our own estimates based partly on the actual costs of the recent Irish changeover (including competitive tenders) and partly on somewhat dated information obtained from the DfT. We have also cross-checked these estimates with sources in the signage industry.

6.3. In summary, our estimate for the UK is that, at 2005 prices, the **one-off** cost of converting road signs would be of the order of £80 million, made up of £20 million for speed limit signs (at the lower end of the range £16 - 30 million) and £60 million for distance signs (at the lower end of the range £25 - 130 million). This may be compared with **annual** UK roads expenditure of £6 billion, of which it represents 1.33%. Full details of our calculations are given below.

Speed limit signs

The 1970 estimate by the Department of Transport

6.4. Although this is primarily of historic interest, it is relevant to quote the cost estimate made by the Department of Transport in 1970 (quoted in the 1972 White Paper). The Minister for Transport Industries, in answer to a Parliamentary Question, replied:

"Nearly £2 million for speed limit signs." (Hansard, 1970)

6.5. If this figure of £2 million at 1970 prices is grossed up to 2005 prices in order to allow for inflation, the corresponding estimate would be approximately £20 million. However, we would treat this estimate with caution since the basis for it was not given. Moreover, there has been considerable road construction and erection of new imperial signs since that date.

UKMA does not believe that the cost of converting road signs need be a significant obstacle to the adoption of metric road signage

The estimated cost of converting speed limit signs in the Irish Republic was €9 million (equivalent to £6 million sterling)

The 1989 estimate by the Department of Transport

6.6. In response to a request under the Freedom of Information Act, (DfT, 2005) the Department for Transport has released the following information.

6.7. In 1989, in preparation for negotiations with the European Commission regarding proposed amendments to the Units of Measurement Directive, the DfT made estimates of the costs of converting both distance and speed limit signage to metres, km and km/h. With regard to speed limit signage, it was estimated that "a cost of £10 million should cover the planning and conversion arrangements".

6.8. However, again, no basis was given for this calculation, and (based on the Retail Price Index) inflation since that date has been of the order of 65% - giving an updated estimate of £16 million.

The cost of converting speed limit signs in Ireland

6.9. A full account of the recent Irish experience is given in Appendix A. This shows that the estimated cost of converting speed limit signs in the Republic was €9 million (equivalent to £6 million sterling), with an additional €2.5 million (£1.5 million) for the accompanying publicity campaign - a total of €11.5 million - equivalent to approximately £7.5 million. In the event, the actual outturn cost was €1 million less than the estimate.

6.10. 35 000 signs were replaced and 23 000 new signs erected. Of this total of 58 000 signs, 900 were within the Dublin city boundary. The average unit cost per sign modified or installed was €140 (£100).

6.11. In 2000 the Republic had 95 714 km of roads (including 5429 km of motorway or national roads). This compares with UK figures of 388 700 km and 34 760 km respectively (Directorate-General for Energy and Transport, 2003). Thus the total length of road in the UK is about four times that in the Republic, and the length of motorway and national (trunk) roads is about six times.

6.12. A crude calculation, using a factor of 5 times, would suggest therefore that the equivalent cost for the UK of converting speed limit signs could be in the region of £30 million, plus, say, £3 million for publicity.

6.13. However, this crude calculation obviously ignores issues of population density and urbanisation. As the UK is significantly more urbanised than the Republic of Ireland, and as there will be proportionately fewer changes of speed limit within a continuous urban area than in a rural area, it can be inferred that the figure for the UK is likely to be substantially less than the £30 million calculated above.

A hybrid estimate

6.14. A further alternative estimate may be obtained by applying the Irish unit cost to an estimate of the number of signs which will need to be converted in the UK. The DfT estimated (Vernon, 2005) that in 1992 the number of speed limit signs in England was as follows:

- "Start of speed limit other than the national speed limit (i.e. showing numerals) - 120,000
- Derestriction / national speed limit applies signs, showing a black diagonal band on a white disc – 67,000
- Repeater signs – 104,000.

The survey did not disaggregate between repeater signs showing numerals and repeater "national speed limit applies" signs. There were also a handful of other signs such as minimum speed. The total number of speed limit signs will have increased since 1992."

6.15. After allowing for Scotland, Wales and Northern Ireland, and assuming some increase in the number of signs since 1992, a figure of 200 000 signs for the UK would seem to be reasonable. Based on a unit cost of £100 per sign (see paragraph 6.10 above), this gives a cost estimate of £20 million for speed limit signs.

6.16. These various estimates are summarised in the table below:

Table 2: Cost of converting speed limit signs in the UK (£million at 2005 prices)

DoT estimate 1970 (grossed up for inflation) (paragraph 6.5)	20
DoT estimate 1989 (grossed up for inflation) (paragraphs 6.6 - 6.8)	16
Irish changeover cost extrapolated to UK (paragraph 6.12)	30
Hybrid calculation (paragraph 6.15)	20

Source: see text

Distance signage

6.17. For obvious safety reasons, speed limits and related signage will need to be changed in a very short period of time (e.g. 1 - 3 days). However, as the Irish Republic has shown, distance signage can be changed over a much longer time period (over 10 years in Ireland). The 1972 White Paper made a similar point, commenting that, with regard to "distance signs, ... phasing is practicable" (paragraph 107).

Speed limits and related signage will need to be changed in a very short period of time (e.g. 1 - 3 days). However, distance signage can be changed over a much longer time period

The cost of converting speed limit signage could be in the range £16 to £30 million, with a "most probable" estimate of approximately £20 million

6.18. The information released by the DfT (see paragraph 6.6 above) also included the following estimates for distance signage.

6.19. Since there were apparently no authoritative figures for the total number of distance signs, it was arbitrarily assumed that there would be an average of 3 signs/km on classified roads and 1.5 signs/km on unclassified roads - resulting in an estimate for the UK of 800 000 signs. It was then further assumed that half of these indicate distances and hence would require to be amended.

6.20. A calculation was then made on three alternative bases:

- (a) Plate over all existing signs in one year: £185/sign, giving ca. £80 million
- (b) 10 year replacement programme: extra cost per sign £30, giving £15 million (inc. admin costs)
- (c) 10 year programme of replacement, but plated over with imperial, then "unveiled" simultaneously: £90/sign, giving £40 million (including admin costs).

6.21. The exercise concluded that "a central estimate of around £30 - 50 million seems sensible." Clearly, inflation since 1989 would increase this figure - perhaps by 65% (based on the Retail Price Index).

6.22. The DfT estimate also points out that any exercise in amending or replacing distance signs would also give an opportunity to rationalise routes and destinations, resulting in better signage and offsetting savings in time and fuel consumption.

6.23. As a check on the DfT estimates, we have contacted a number of companies which manufacture and/or install distance signs in order to seek their comments. The responses indicated a wide range of possible costs, depending on the type of sign and the method employed. However, the range of costs is consistent with the estimates made above. Appendix C gives more detail of the survey.

6.24. We would not advocate such an extended period as in Ireland, particularly on motorways and trunk roads (which carry the most traffic), but there is clearly considerable scope for spreading this expenditure and in many cases combining routine repair and maintenance with metric conversion. Because of these uncertainties any estimate must be tentative, but it is likely that much of this work could be absorbed within current budgets.

Conclusion on costs

6.25. We have shown that the cost of converting speed limit signage could be in the range £16 to £30 million, with a "most probable" estimate of approximately £20 million. This will be a "one-off" cost which will have to be met from capital budgets within a single or at most two financial years.

6.26. The cost of converting distance signage could be within the range £25 million to £130 million depending on the method chosen, with a "most probable" estimate of about £60 million. As indicated above, if it were phased over several years it would be unlikely to show up in the current accounts as a substantial amount.

6.27. The total for both speed limit and distance signage can therefore be estimated to lie within the range £41 - 160 million, but with a "most probable" estimate of £80 million, some of which would be absorbed within annual revenue budgets.

6.28. Opponents of the principle of metric conversion of road signage will of course try to use these estimates to argue that the costs would be too great and that conversion should be still further postponed - or abandoned completely. We therefore believe it is appropriate to compare this estimated expenditure with the published figures for total Government expenditure on roads. We have extracted the following figures for 2002/03 (the latest year fully available at the time of writing) from Table 1.15 of "Central and local expenditure on transport, 1999/2000 to 2003/4" (Department for Transport, 2004). This is shown in Table 3 below.

The total for both speed limit and distance signage can therefore be estimated to lie within the range £41 - 160 million, but with a "most probable" estimate of £80 million, some of which would be absorbed within annual revenue budgets

Table 3: Total annual roads expenditure in Great Britain, 1999 - 2004

	£million (outturn prices)				
	1999/2000	2000/1	2001/2	2002/3	2003/4
Central government expenditure					
Capital					
Strategic roads	1079	1021	1152	1395	1038
Other roads and traffic	5	16	25	16	51
Current					
Strategic roads	574	760	776	819	982
Other roads and traffic	78	94	87	101	98
Local government expenditure					
Capital					
Roads	1091	1286	1770	1279	n.a.
Current					
Roads	2085	2227	2398	2476	2847
Total government expenditure	4912	5404	6208	6086	n.a.

Source: Calculated from Table 1.15 of "Central and local expenditure on transport, 1999/2000 to 2003/4" (Department for Transport, 2004)

If averaged over a five year conversion period, the costs would amount to 0.27% of annual roads expenditure

6.29. What Table 3 shows is that total government expenditure on roads in Great Britain, including new construction, widening, repairs and maintenance, installing and replacing signs, winter gritting etc, in 2002/3 was just over £6 billion (annually recurrent). Our "most probable" estimate of the **total one-off** cost of conversion of road signs (both speed limit and distance) is thus approximately 1.33 % of this **annual** expenditure. If averaged over a five year conversion period, the costs would amount to 0.27% of annual roads expenditure. We leave readers to draw their own conclusions on whether this is a significant amount.

Safety

6.30. The second essential condition of the metric conversion of Britain's road signs is that it should be done safely. Again, the experience of other countries has shown that, with good planning and management, this can easily be achieved.

6.31. The main safety issues concern the signing of speed limits. We do not believe that distance signage presents a safety problem: even if drivers mistake kilometres for miles on road signs, the most serious consequence is that drivers will arrive at their destination rather earlier than they had expected. Similarly, although it would be incongruous if speed limit signage were denoted in km/h while distance signs continued for a period to be in miles (or vice versa, as in the Irish Republic), this would not be a safety issue.

6.32. The safety issues which arise in relation to speed limit signage are as follows:

- Timing and period of conversion
- Clarity of signage
- Appropriateness of the new speed limit
- Non-correspondence of speedometers and signage
- Driver awareness of the new limits

We deal with these issues below.

Timing and period of conversion

6.33. As we have argued above at paragraph 5.15, there must be no dubiety about whether a speed limit is in km/h or mph. It is essential therefore that the changeover takes place in as short a period as possible. Ideally, this should be overnight or at most over a weekend (as in Canada in 1970). However, there is an increased cost implication to such a short period, and it may be felt that a period of up to three days (as was planned in the Irish Republic in January 2005) would be acceptable.

6.34. It would be best if the change were made outside peak traffic periods and when lighting and weather conditions are likely to be good. This suggests that spring would be the optimum time of year.

Clarity of signage

6.35. Current approved speed limit signs in the UK do not indicate that the figures represent miles per hour: drivers are assumed to know this. However, when the signs are changed it is important, at least initially, to remind drivers that the new limits are in kilometres per hour (km/h). We would therefore advocate the Irish practice of including the international symbol "km/h" on the sign itself, as in Figures 13 and 14.

6.36. As a result of incorporating the symbol, the sign will need to be slightly larger. This increase will also accommodate the extra digit on the higher speed limit signs (e.g. 120 km/h).

Appropriateness of the new speed limit

6.37. We have argued above (paragraph 5.16) that the changeover to metric speed limits presents an opportunity to review those limits, especially at the local level - for example in the vicinity of schools, within residential areas and close to accident "blackspots". This has the potential to improve safety, and we believe that highway authorities should be required to review speed limits at the same time as preparing for the changeover (thus avoiding any question of having to change signage twice).

Non-correspondence of speedometers and speed limit signs

6.38. Regulation 35 of the UK's Road Vehicles (Construction and Use) Regulations (SI 1986/1078) require that "every motor vehicle shall be fitted with a speedometer which, if the vehicle is first used on or after 1st April 1984, shall be capable of indicating speed in both miles per hour and kilometres per hour, either simultaneously or, by the operation of a switch, separately." In practice, most vehicles sold in the UK since then have mph predominant, with the km/h in smaller figures which are often only readable with difficulty. Some recent models have a facility to switch electronically between mph and km/h. However, there is no requirement that the km/h should be easily readable. There is therefore an obvious problem that drivers may not be able to relate the speed shown on their vehicle speedometer in mph to the speed limits denoted on traffic signs in km/h. We discuss below possible ways of overcoming this problem.

6.39. In the first place, we believe the Regulations should be amended to require all newly registered vehicles to have easily legible km/h on their speedometers. Over a period of several years, as older vehicles are scrapped and replaced, the problem of non-correspondence will tend to die out. We have calculated from Tables 15.8 and 15.9 of the Annual Abstract of Statistics 2005 that, even in the short term (say, within three

The changeover to metric speed limits presents an opportunity to review those limits, especially at the local level - for example in the vicinity of schools, within residential areas and close to accident "blackspots".

We believe that this simple change (legible km/h on speedometers) should be implemented immediately

years), at the recent rate of replacement, approximately 30% of vehicles in use at any one time would be compliant. As this has little or no cost implication, we believe that this simple change should be implemented immediately.

6.40. As far as the remaining non-compliant vehicles are concerned, there is the option of fitting devices (e.g. overlay stickers on the speedometer dial) which would convert mph to km/h. Alternatively, the complete speedometer could be replaced. However, both these options were considered and rejected by the Irish Department of Transport. It was found that the use of overlays was technically difficult since the distance between the actual dial and the glass or perspex cover created parallax problems as different drivers would view the dial from different angles - leading to inaccurate readings. The cost of "retro-fitting" new speedometers to older vehicles was found to be prohibitively expensive. We therefore agree with the Irish decision to reject these options.

6.41. The remaining option is that of driver education. We deal with this in the next section.

Driver awareness of the new limits

6.42. At the time of conversion of speed limit signage, drivers will need to be aware of two things:

- that the speed limits are about to change; and
- what the new limits mean.

6.43. The first of these can be tackled by a campaign of publicity before and during (and possibly just after) the changeover period. The view was taken in Ireland that a short sharp "blitz" of publicity would be more effective than a longer, quieter campaign. This approach appears to have been successful (see Appendix A), and we doubt whether on the day of the changeover more than a handful of drivers were unaware of the change.

6.44. The second of these objectives - explaining what the new limits mean - was achieved in Ireland by a blanket distribution of leaflets (illustrated at Figure 12) to every household as well as press and television advertising and a dedicated website. The emphasis was on memorising the approximate equivalents (e.g. 50 km/h = 31 mph) rather than taxing drivers' arithmetic abilities with conversion factors such as "multiply by 5 and divide by 8" or "multiply by 0.6" to convert km to miles. Again, this seems to have been accepted without difficulty and to have been effective.

Conclusion on safety

6.45. The evidence from both Australia in 1974 and the Irish Republic in 2005 is that the change from imperial to metric speed limit signage can be made with complete safety. In both cases there were predictions of widespread confusion and that "ignorance of the meaning of metric speeds would lead to slaughter on the roads". Yet such confusion and slaughter did not occur (Wilks, 1992, p. 31). Indeed, in Ireland the end result was almost certainly a net gain in safety as the speed limit on rural, single carriageway roads (91% of the network) was lowered from 60 mph to 80 km/h - a reduction of 16%.

**The evidence ...
is that the
change from
imperial to metric
speed limit
signage can be
made with
complete safety**

Figure 12: Irish publicity leaflet

This leaflet was distributed to every household in the Republic and printed in major newspapers as part of a €2.5 million campaign. Note the incorporation of the correct use of the international symbol "km/h" within the speed limit sign.

Speed Limits

GO METRIC from 20 Jan

Category	Sign Type	Speed Limit (km/h)	Equivalent (mph)
Towns & Cities	White Sign	50	31
Regional (R) & Local Roads	White Sign	80	50
National Roads (N)	Green Sign	100	62
Motorway (M)	Blue Sign	120	75
Special Speed Limits	White Sign	60	37
	White Sign	30	19

Check the signs. Check your speed.
The law will commence on Thursday 20th January 2005.

Department of Transport
An tAire Traidiseála

GO METRIC GO SAFE SAFETY

Lo Call 1800 60 60 60 www.gometric.ie

7 National changeover plan

7.1. In this chapter we propose a planned sequence of actions which would achieve the objective of converting Britain's road signage to metric units, in accordance with the assurances implicit in the Government's agreement to the Units of Measurement Directive (89/116/EEC) in 1989.

7.2. The responsibility for producing such a plan belongs properly with the Department for Transport. UKMA therefore asked the Department in April 2005 to disclose its contingency plan for fulfilling this obligation. However, the response of the Department was: "We do not have such a document" (Vernon, 2005). UKMA regards this as a particularly shocking admission by a Government Department that, notwithstanding its Permanent Secretary's confirmation (Rowlands, 2003) that there is a clear obligation to fix a date, it has failed in 16 years to do anything about it. It leaves the Department open to accusations of bad faith.

7.3. In the absence of an official plan, it falls to others to attempt to fill this gap.

7.4. We see the process as involving the following elements:

- (a) at the outset, an announcement of irrevocable commitment and publication of a provisional plan and timetable
- (b) putting in place effective management arrangements
- (c) review of speed limits
- (d) allocating the necessary finance
- (e) any legislation needed
- (f) physical conversion of the signage
- (g) driver education and publicity

7.5. We discuss these elements below, and put forward a possible timetable.

Announcement of irrevocable commitment

7.6. It is essential to the credibility of the project that the Government makes it clear that, once the conversion process has begun, there can be no turning back, and that it will be carried through to its conclusion. In order to protect the programme from future attempts to reverse it, it is desirable that contractual commitments should be entered into at an early stage. Since most highway works are carried out by private contractors, it should be possible to let or negotiate suitable long term contracts.

7.7. The announcement will need to include a provisional timetable and an offer to consult on the details (but obviously not the principle) of the plan. It is possible that the outcome of the consultation would affect the method and timetable.

It is essential to the credibility of the project that the Government makes it clear that, once the conversion process has begun, there can be no turning back, and that it will be carried through to its conclusion

Lack of Parliamentary time should not be a significant constraint

Management

7.8. The plan and programme will need to be effectively managed, both at a political and at an official level. It is likely that an experienced project manager will be needed (possibly from outside the Department of Transport) to give the project additional impetus and clarity of purpose.

Finance

7.9. The finance required for the project is likely to be partly short term and partly longer term. The one-off costs of converting speed limit signs are likely to fall within two successive fiscal years, and the Treasury will need to budget this expenditure (possibly of the order of £20 millions) over two years. The replacement or amendment of distance signage is assumed to be spread over several years and will be at least partially absorbed within annual maintenance budgets. In so far as it results in additional costs to highway authorities, again the Treasury will need to make additional provision for inclusion in the Revenue Support Grant and in the budget of the Highways Agency.

Legislation

7.10. As far as we have been able to ascertain, there will be no requirement for primary legislation. The current speed limits in miles per hour are laid down in the sections 81 - 84 of the Road Traffic Regulation Act 1984, but they can be altered by statutory instrument subject to Parliamentary approval (i.e. secondary legislation). Similarly, the Traffic Signs Regulations and General Directions (also made under the Road Traffic Regulation Act) can be altered by statutory instrument; moreover, Regulation 8 of the TSRGD empowers Ministers to "authorise the erection or retention of traffic signs of a character not prescribed by these Regulations".

7.11. It would therefore be relatively simple for Ministers to make immediate and relatively uncontroversial changes to the existing regulations. For example, there would be obvious advantages for the tourist industry and for outdoor leisure activities if Ministers were to authorise metres and km on pedestrian and footpath signs and on brown tourist signs. It is also highly desirable that the symbol "m" should be reserved to denote "metres" and conversely that it should no longer be used to mean "miles", for which there is no approved symbol (or abbreviation). This obviously sensible proposal was referred to in the DfT's internal paper in 1989 (DfT, 1989).

7.12. Amendments will also be required to the Road Vehicles (Construction and Use) Regulations (especially in relation to vehicle speedometers) and other regulations which relate to speed limits and signage. Again, however, it is believed that all these can be dealt with as secondary legislation. Lack of Parliamentary time should not therefore be a significant constraint.

Review of speed limits

7.13. One of the advantages of converting speed limits is that it will present an opportunity to review existing speed limits. We have suggested the default values in paragraph 5.17 above, but apart from reviewing whether current limits are appropriate (e.g. in the vicinity of schools, or at congested motorway junctions), there are decisions to be made whether to revise the 40 mph limit down to 60 km/h or up to 70 km/h. Similarly, a decision will be needed on whether to round 70 mph down to 110 km/h or up to 120 km/h (or indeed higher). This review process will need to be undertaken in the early stages of the changeover, so that the correct new signage can be ordered and manufactured, and highway authorities will need to be required to commence the process without delay.

It would be preferable to complete the conversion of blue signs on motorways and green signs on other primary routes in the period before the speed limit changeover

The physical conversion of the signage

7.14. In paragraphs 6.17 - 6.24 above, we have considered whether distance signage could or should be amended over a short period (12 months) or a long period (10 years). Here, we assume a compromise of 5 years, which spreads the cost without excessively prolonging the slight inconvenience of different signage in different areas or on different classes of road. However, because of the vulnerability of any programme to political obstruction or delay, we would wish to see the speed limit changes completed within three years of the start of the programme.

7.15. Although distance signage conversion can be spread over a number of years, it is important to prioritise the conversion. Low impact signage, such as distances in yards, which the Department of Transport acknowledged are practically equivalent to metres (DfT, 1989), could be amended or replaced through normal sign replacement. Similarly, distance signs indicating miles on minor roads and footpaths (white signs) could be changed to kilometres over a longer period.

7.16. In contrast, it would be preferable to complete the conversion of high impact signage (such as marking distances to major destinations on blue signs on motorways and green signs on other primary routes) in the period before the speed limit changeover.

7.17. As described in paragraph 4.16 above and illustrated in Figure 4, the TSRGD requires that height and width restrictions are signed in imperial units with the option of supplementary metric units. Similarly large commercial vehicles must have the vehicle height marked in the cab. In order to bring such signage into line with vehicle manufacturer's manuals, and to facilitate the eventual removal of the imperial signage, it will be necessary to ensure that all new and replacement signs indicate the restrictions separately in both metric and imperial. No further new imperial-only signage should be erected, and from a cut-off date, a programme of removing the non-compliant imperial signage can be undertaken.

It is essential that a programme of publicity and driver education is undertaken at appropriate stages in the programme

Publicity and driver education

7.18. Finally, it is essential that a programme of publicity and driver education is undertaken at appropriate stages in the programme. The Irish experience (see Appendix A) has shown that a short, intensive burst of publicity is effective in the period before the speed limit change. However, we feel that some lower profile explanation of the changes to distance signage and height and width restrictions will also be appropriate. In order to reduce costs, such publicity material could, for example, be distributed with the paperwork for the annual road tax renewal and/or MOT test.

7.19. It is important to involve local government in preparing the public for change. Information – especially on local distances and speed limits - could be provided at no extra cost through existing channels such as local authority newsletters and websites.

7.20. It is also highly desirable that the Government encourages motoring, haulage, safety and industry associations to help communicate information about the programme to their members.

A possible programme

7.21. Below, we have suggested a programme of work with a possible five-year timetable. The purpose of this is not to be prescriptive but simply to demonstrate that the conversion of Britain's road signage is perfectly feasible at reasonable cost.

Table 4: Road sign conversion - possible 5-year programme

Year	1	2	3	4	5
Announcement	Announce decision				
Management	Appoint project manager	Invite tenders and let long term contracts			
Legislation	Immediate minor amendments to secondary legislation. Consultation on major amendments	Major amendments to secondary legislation			
Review speed limits	Highway authorities review speed limits		Implement new speed limits		
Publicity	Publicise announcement	Low level publicity	Major publicity for speed limit change	Low level publicity	
Physical conversion - low impact distance signs		Start amending/replacing distance signs	Continue amending distance signs.	Continue amending distance signs	Finish amending distance signs
- high impact distance signs	Start replacing/amending distance signs	Continue replacing/amending distance signs	Finish amending/replacing distance signs		
- speed limit signs			Replace all speed limit signs		
- height, width and length restriction signs	Metric dimensions in parallel to imperial compulsory for all new signs	Add metric units to imperial-only signs	Finish adding metric units to imperial-only signs	No new imperial signage	Start removing imperial restriction signage
Finance (£ million)					
-distance signs	5	25	15	10	5
- speed limit signs			20		
Total cost	5	25	35	10	5
Total cost as % of annual roads expenditure	0.08	0.42	0.58	0.17	0.08

We call upon the Government to commit themselves publicly to making the change and to publish a plan and timetable for bringing it about as soon as reasonably practicable

8 Conclusion

- 8.1 We have demonstrated that the adoption of metric road signage in the UK would bring overwhelming benefits for the nation's general measurement system, would have very significant advantages for road users, designers and builders, and would therefore be in the national interest. We have shown that there are no plausible objections on grounds of practicality, or cost, or safety. Given commitment from the Government - it could be accomplished economically and safely within three to five years.
- 8.2 The principal obstacle preventing the Government from giving this commitment is - frankly - political. Politicians fear that converting road signage may lose them votes.
- 8.3 UKMA appreciates very well that in a democracy political leaders have to get elected and cannot afford to alienate public opinion on issues which are deemed to be central to voters' concerns. However, we do not believe that road signage is such an issue. We are confident that, if the true facts were properly explained, there would be no longlasting adverse political effect from what is, in reality, a fairly minor change. We believe that the reform would be likely to settle down within a few days - just as it has in the many other countries which have made the change. Indeed, the Government could well gain credit for persevering with its modernisation and reform programme in the face of uninformed and irrational opposition.
- 8.4 We therefore call upon the Government and their various advisers to acknowledge the force of our argument, to commit themselves publicly to making the change and to publish a plan and timetable for bringing it about as soon as reasonably practicable.

Appendix A: Experience of other countries

When the British Government announced in 1965 that the UK was to "go metric" within 10 years, the natural assumption was that conversion of road signs would be an integral part of this process. Other Commonwealth countries, notably Australia, planned a comprehensive changeover and accomplished this successfully in the 1970s.

In the UK, on the other hand, plans to convert the roads were postponed in 1970 and never re-instated, with the result that we are still in the "very British mess" of trying to use two incompatible systems.

The accounts below describe ways in which it could have been done in the UK - and still should be.

Australia

[This account is extracted from Kevin Wilks (1992), p. 31]

"One of the most important and publicly visible of the metric changes was the change in road speed and distance signs and the accompanying change in road traffic regulations. M-day for this change was 1 July 1974 and, by virtue of careful planning, practically every road sign in Australia was converted within one month. This involved installation of covered metric signs alongside the imperial sign prior to the change and then removal of the imperial sign and the cover from the metric during the month of conversion.

Except on bridge-clearance and flood-depth signs, dual marking was avoided. Despite suggestions by people opposed to metrication that ignorance of the meaning of metric speeds would lead to slaughter on the roads, such slaughter did not occur.

A Panel for Publicity on Road Travel, representing the various motoring organisations, regulatory authorities and the media, planned a campaign to publicise the change, believing that public education, not the confusion that would result from dual sign posts, would be the most effective way of ensuring public safety. The resulting publicity campaign cost \$200 000 and was paid for by the Australian Government Department of Transport.

In addition, the Board produced 2.5 million copies of a pamphlet, "Motoring Goes Metric", which was distributed through post offices, police stations and motor registry offices.

For about a year before the change, motor car manufacturers fitted dual speedometers to their vehicles and, after 1974 all new cars were fitted with metric-only speedometers. Several kinds of speedometer conversion kits were available.

"...public education, not the confusion that would result from dual sign posts, would be the most effective way of ensuring public safety."

As a result of all these changes, conversion on the roads occurred without incident.

As a result of all these changes, conversion on the roads occurred without incident.

Co-ordinated with the road change, tour guides, road maps and street atlases were also produced in metric and, of course, traffic regulations in each State were amended to metric measurements.

The opportunity was also taken to change the design of road signs to conform to internationally recognised standards.



The change to metric on the roads quickly led to changes in the units used by motor car enthusiasts and engine power in kilowatts (kW) quickly replaced horsepower and newton metres (N.m) replaced foot pounds as the unit of torque. The kilometre, though mispronounced kilom'etre more often than not, soon became the unit of distance and the 'k', as in "doing 100 k", became the jargon for kilometre.

After consideration of all aspects, the litre per hundred kilometres (L/100 km) was adopted as the preferred unit of fuel consumption. This was the system most frequently used in metric countries. The arithmetical process was neither harder nor easier than that of calculating miles per gallon or kilometres per litre and was more universally meaningful. As it is a compound unit, the public has found this a more difficult conversion to which to adjust than miles to kilometres or gallons to litres. Claimed fuel consumption was stated in L/100 km by all Australian motor car manufacturers and its use as a unit was gradually established.”

Ireland

[This account is based on an article in UKMA News describing a visit to Dublin by UKMA Chairman, Robin Paice, on 18 - 21 January 2005 to observe the Irish changeover to metric speed limits and signage. The full report is available by e-mailing chair@metric.org.uk].

"My visit confirmed that with good planning and public information, the change can easily be accomplished without any serious "confusion" or safety problems.

Ireland has been gradually changing its distance signage to km and metres for over 10 years (thus spreading the cost) and decided to review speed limits and change signage in 2004. In the event the legislation was delayed, so that the actual changeover was on 20 January 2005.

The method chosen was complete replacement of 35 000 old mph signs (using existing posts) and installation of 23 000 completely new signs – e.g. where a national road (speed limit 100 km/h) joined a local rural road (80 km/h). The option of using decals (transfers) was rejected as being a temporary measure, leading to a further replacement at increased cost. The new signs are distinctive, being larger, using a narrower font (to accommodate the extra digit) and all include the international symbol "km/h".

I met several Irish Department of Transport officials, who gave me a lengthy briefing and a pack of materials and even drove me around the Dublin and Co Wicklow areas. They were at pains to stress that the change was not simply about metrication: it was also about reviewing and changing the actual speed limits themselves. In particular the limit on rural, single carriageway roads (91% of the network) has been reduced from 60 mph to 80 km/h. There were therefore strong safety arguments for the change, which was supported by the National Safety Council and the AA.

In the Irish Republic the issue of metrication has not been politicised as it has in the UK. My impression was that people accepted the need for the change as part of the modernisation of the state. They wanted it to be done competently and to get it over with rather than argue about the principle. The fact that a large proportion of drivers had received no metric education at school was never mentioned as a factor influencing the changeover programme.

The key to a successful changeover was believed to be a very rapid conversion of the actual signs preceded by a blitz of information and publicity in the two weeks preceding the change. Drivers were therefore left in no doubt as to what was happening and were warned that ignorance or confusion about the new limits would not be accepted by the

With good planning and public information, the change can easily be accomplished without any serious "confusion" or safety problems.

Figure 13: Bilingual sign in Dun Laoghaire, near Dublin (Note that the international symbol, km/h, is independent of language)



Figure 14: Speed limit sign on the M11 motorway near Dublin

police as an excuse for breaking the new limits. Examples of the publicity can be seen on a special website www.gometric.ie.

Perhaps the biggest issue was that most vehicle speedometers did not have easily legible km/h on the dial. It was decided that it was not practical to require speedometers to be “retrofitted” with new km/h dials, and the emphasis was therefore on familiarising drivers with the approximate conversions (e.g. 50 km/h = 31 mph). Every household received leaflets with conversion charts which could be kept in the car. All newly registered cars are required to be metric-only or metric-predominant.

The other main safety issue was the cross-border problem in the North (particularly where the border was not marked). This was tackled by placing new signs on each side of the border crossing, so that drivers would be aware that they were entering a different speed limit zone.

The cost was comparatively modest: €8 million for the signs (about €140 per sign), plus €2.5 million for the publicity campaign. (The Republic’s population is about 4 million, of which over 1.1 million live in Greater Dublin).

In the week before the changeover the weather forecast was for blizzard conditions, and the DoT therefore authorised local authorities to commence installing the new signs in the previous week – with the result that the operation was completed ahead of schedule nearly everywhere.

The actual changeover on 20 January seems to have been almost a non-event. Everything went according to plan, and the predicted chaos and confusion did not occur. As one would expect, the media tried to portray it as a fiasco, but the best they could come up with was a 100 km/h sign outside a school (which was on a national road which the local authority had failed to review). Note that this “story” was not that metrication itself was a problem: rather, the local authority was accused of incompetence in not lowering the previous national speed limit of 60 mph on this stretch of road.

During my visit I was intrigued to learn that a delegation of UK DfT officials was due to see the same Irish officials that I had seen and to observe the changeover. So what conclusions should they have drawn? The obvious lesson is that the conversion of speed limit signs to metric is no big deal. With proper planning and management, it can easily be accomplished at modest cost with no significant safety problems. In particular the DfT’s stated reason for continually postponing metric conversion in the UK - that it would be “confusing” for older drivers - has been demonstrated to be specious and disingenuous.

The actual changeover on 20 January seems to have been almost a non-event. Everything went according to plan, and the predicted chaos and confusion did not occur.

Appendix B: The legal background

This section is an attempt to summarise the relevant law relating to the erection of traffic signs on the roads and footpaths of England, Scotland and Wales. The main provisions are:

- European Union Directive 80/181/EEC (the "Units of Measurement Directive")
- The Units of Measurement Regulations 1986 (SI 1986 No 1082)
- The Town and Country Planning (Control of Advertisement) Regulations 1992 (SI 1992 No. 666) (TCP CAR) (and its Scottish counterpart)
- The Road Traffic Regulation Act 1984
- The Traffic Signs Regulations and General Directions 1994 (TSRGD) (SI 2002 No. 3113)

European Union Directive 80/181/EEC (the "Units of Measurement Directive")

This Directive, as amended by Directive 89/617/EEC, required Member States to enact legislation to harmonise units of measurement throughout the Community and to make "Système International" (SI) the primary system for "economic, health, safety or administrative purposes". This definition clearly includes traffic signs.

However it was agreed that those Member States which, before accession to the EEC, had used different systems (mainly the UK and Ireland) should adapt to the metric system at their own pace. In particular, these states agreed that they would themselves "fix a date" for converting to metric road signage and for phasing out other imperial units.

It was also agreed that "supplementary indications" (i.e. imperial equivalents of SI units) should be permitted for a limited period (until 2009).

The Directive also prescribed the correct international symbols to be used to denote both SI and imperial units. Thus, the symbol "m" was reserved to denote "metre" (not "mile"). The correct symbols for feet and inches are "ft" and "in" (not ' and " as required by the TSRGD).

The Units of Measurement Regulations 1986 (SI 1986 No 1082) (the UMR)

These Regulations (as amended) were intended to fulfil the (voluntarily agreed) obligation of the UK to translate the above Directive into UK law. They prescribe that, with the time-limited exceptions mentioned above, SI

is the only system of weights and which is legal in the UK for these same "economic, health, safety or administrative purposes".

However, the Regulations are primarily declaratory and did not create any offences - with the result that they are difficult to enforce.

The Department of Trade and Industry have issued strong advice (DTI, 1995) to public sector organisations that they should only use SI units (subject to the time-limited exceptions), even suggesting that the use of imperial measures could invalidate contracts and regulations. However, this advice does not appear to have been fully acknowledged or accepted (UKMA, 2004, paragraphs 7.1 - 7.4).

The Town and Country Planning (Control of Advertisement) Regulations 1992 (SI 1992 No. 666) (the TCPCAR)

The relevance of these Regulations is that, within the meaning of the Town and Country Planning Act 1990 (and its Scottish counterpart), a traffic sign is an "advertisement". These Acts authorise the relevant Secretary of State (or Scottish Ministers) to make Regulations for the control of advertisements "in the interests of amenity and public safety" (and for no other purpose).

The Regulations exempt signs from control if they fall within certain categories, amongst which are "traffic signs" as defined in the Road Traffic Regulation Act 1984 (RTRA). Any other sign requires consent.

Government advice (DoE, 1992) is that, since control can only be exercised in the interests of amenity and public safety, there can be no planning control over the subject matter of the advertisement (this must include whether it employs metric or imperial measurement units).

From this it is clear that provided that consent is obtained under the TCPCAR, signage displaying metric units can legally be erected. Local planning authorities may of course grant themselves consent if they are satisfied that there is no problem of amenity or public safety.

The Traffic Signs Regulations and General Directions 2002 (SI 2002 No. 3113) (the TSRGD)

The TSRGD specifies and describes signs which are authorised for the purposes of Section 64(1) of the RTRA. These Regulations do not explicitly authorise or prohibit imperial or metric units in principle. However, the majority of the units authorised are in practice imperial – with some exceptions in the case of height and width signs for vehicles or bridges, etc, where dual units (metric and imperial) are permitted. The units authorised for distance signs and speed limits are exclusively imperial.

However the TSRGD also purports to authorise certain symbols (incorrectly described as "abbreviations") (including "m" to denote "mile" in Diagrams 2011 and 2012 of Schedule 7, Part 1, and Diagram 629.1 of Schedule 16(6)(3)) which are inconsistent with the Units of Measurement Regulations 1986, and which do not comply with EC Directive 80/181/EEC (the "Units of Measurement Directive"). This is in spite of the DTI advice (1995) referred to above.

Appendix C: Costs of amending distance signs

As a check on the tentative and dated estimates of the cost of amending or replacing distance signs made by the DfT in 1989 (paragraphs 6.18 - 6.22), we contacted some manufacturers and installers of traffic signs for their comments. The following picture emerged:

- Modern signage is generally made up of reflective vinyl overlays fixed to an aluminium plate. Large signs consist of separate plates clipped together and fixed to a frame. The cheapest method of conversion would be to fix further vinyl overlays over the existing. The result is less durable than total replacement, and owing to differences in surface weathering and reflectivity it would often be apparent that the signs had been amended. However, this method is sometimes employed with reasonably satisfactory results.
- The next cheapest option would be to fix aluminium cover plates to the existing plates by riveting. However, this practice is not recommended since the drilling of the aluminium can lead to water ingress, resulting in lifting of the vinyl overlay and loss of reflectivity. It would also void the manufacturer's guarantee.
- A third option is to remove the sign to a workshop and amend the sign under factory-controlled conditions, to give a life of possibly 10 years. This would be visually more satisfactory than attempting to fix vinyl overlays with the sign in situ.
- The most expensive option is total replacement.
- Where signs are amended rather than replaced, the cost of the actual hardware (whether vinyl overlay or aluminium plate) is a small proportion of the cost. The costs of labour, vehicles, plant and traffic management (if required) predominate.
- The cost per sign will vary widely, depending on size and location. One contract manager estimated that a team of two workers and a van could amend standard roadside signs with overlays at the rate of 10 - 20 per day, suggesting a unit cost of £25 - 50 per sign. However, the largest motorway signs, especially if mounted on overhead gantries, could cost over £1000 to amend. Installation of a completely new motorway sign, including concrete base, posts, frame and lighting could exceed £4000.
- The guaranteed life of traffic signs is normally ten years. Hence, assuming an even age profile of the signs, a ten year replacement programme could be absorbed within normal replacement costs.

Without a more detailed breakdown of the number, size and location of signs, and the method of amendment, it is not possible to make an accurate estimate. However, our "most probable" estimate of £60 million for a five-year programme of amending or replacing 400 000 signs (based on the DfT's 1989 estimate grossed up for inflation) gives a unit cost of £150/sign. This is consistent with the range of the costs indicated above and may indeed be an overestimate.

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Metric Signs Ahead – 2009 update

Since the publication of “Metric Signs Ahead” in 2006, a number of changes have occurred.

Deletion of the requirement to “fix a date” for metric road signage (paragraphs 4.39 and 4.40)

Earlier this year, the European Union amended Directive 181/80/EEC (the “Units of Measurement Directive”) to delete the requirement that the UK and Ireland should “fix a date” for converting road signage to metric units. Although the Irish Republic had already completed its conversion programme, the UK’s Department for Transport had not in fact complied with this requirement and had indicated that it had no plans to do so. The amendment therefore made little practical difference.

Needless to say, this change in EU law in no way detracts from the case for converting the UK’s road signs.

The Department for Transport’s cost estimates

In response to the publication of “Metric Signs Ahead”, in February 2006 the Department for Transport published its own revised estimates of the cost of converting road signs. This can be found on the DfT website at <http://www.dft.gov.uk/pgr/roads/tss/general/estimatingcostconversion>.

This gave “a broad indication of what it would cost to convert speed and distance measurements on traffic signs to metric units, if such a change were to be made.” It was estimated that the cost of amending or replacing “around ½ million signs” would be in the range £680 – 760 million. This gives an average of approximately £1400 per sign.

In contrast, “Metric Signs Ahead” estimated (paragraphs 6.2 – 6.27) that the cost would be in the range £41 – 160 million, with a “most probable” figure of £80 million, some of which would be absorbed within annual revenue budgets. This gives an average cost of £160 per sign.

The reasons for this enormous discrepancy appear *inter alia* to be:

- (a) The DfT assumes all work is carried out in a single year, not phased over several years as part of natural replacement (as in Ireland).
- (b) It is assumed that all sign changes will incur costs of “traffic management” of £271 – 309 per sign (unlikely to be required in the great majority of cases).
- (c) It is assumed that, in order to accommodate the symbol “km”, all “route confirmatory” (i.e. distance) signs will need to be replaced rather than amended (this is contrary to the Irish experience).
- (d) 25% has been added for “supervision, preparation and design”, although this would be a simple repetitive operation probably using a “schedule of rates” type of contract.

- (e) 45% - 65% has then been added for “optimism bias” (in accordance with Treasury rules applicable to major construction projects – not to routine “schedule of rates” contracts – hence, it is inappropriate).

UKMA has subsequently obtained further information under the Freedom of Information Act which tends to confirm that UKMA’s estimates are consistent with actual current costs. For example, in 2007/8 Portsmouth City Council installed 3128 new “20 mph” primary and repeater speed limit signs on new posts and new roundels at a total cost of £ 312 671.28 (including £ 30 668.03 design costs) – giving an average cost of £100 per sign.

It is obvious that the DfT’s estimates are a gross exaggeration and clearly not credible.

Revised figures for total annual expenditure on roads and other transport

Table 3 on p. 37 of “Metric Signs Ahead” quoted DfT figures for 2002/3 (the latest year then available) showing that total central and local government expenditure on roads was more than £6 billion (annually recurrent). This figure was subsequently revised to £7 billion, and total government expenditure on all forms of transport in 2004/5 was £17 billion.

It is now possible to update these figures further, and the revised Table 3 appears overleaf.

This shows that total central and local government expenditure on roads rose to over £9 billion in 2006/7, and other transport expenditure to more than £12 billion – giving total expenditure on transport as nearly £22 billion. This is of course an annually recurrent figure.

The one-off cost of converting road signs – whether using UKMA’s or the DfT’s estimate - especially if spread over a number of years (as it could be), would thus be an insignificant proportion of the DfT’s total budget.

Revised Table 3

Below is a Table which revises and updates Table 3 of "Metric Signs Ahead":

Total annual roads expenditure in Great Britain, 2003 - 2008							
				£million (outturn prices)			
			2003/4	2004/5	2005/6	2006/7	2007/8
Central government expenditure							
	Capital						
		Strategic roads	601	778	938	1375	1320
		Other roads and traffic	53	43	34	44	23
	Current/resource						
		Strategic roads	1493	1480	1578	1687	1704
		Other roads and traffic	160	123	158	184	176
Local government expenditure							
	Capital						
		Roads	2156	2396	2649	2693	n.a.
	Current/resource						
		Roads	2729	2867	3135	3185	n.a.
Total government expenditure on roads			7192	7688	8492	9168	n.a.
Other government transport expenditure			9491	9366	10 205	12 546	n.a.
Total government expenditure on transport			16 683	17 054	18 697	21 714	21 476
Source:			Extracted from Table 1.15 "Central and local government expenditure on transport, 2003/04 to 2007/08" in Transport Statistics Great Britain 2008 (Department for Transport, 2008)				

Note: The format of this revised table differs from that which appears in "Metric signs ahead". This is because the statisticians have changed the definition of "capital" and reclassified large amounts of spending from capital to "revenue and resource". This does not affect the overall totals.



The UK metric Association is an independent, non-party political single issue pressure group which advocates the full adoption of the international metric system (SI) in the United Kingdom as soon as is practicable. It is funded entirely by members' subscriptions and personal donations.

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