Chapter 15 Information for Transport Users

15.1 Strategic Role of Information for Users

Traffic and travel information can be used in a variety of ways to influence the behaviour of the travelling public. Accurate, relevant and timely traffic and travel information can affect behaviour by encouraging travellers to make informed journey choices. The choices may include:

- ❑ the best time at which to make a journey;
- ❑ the best mode(s) of transport to use;
- ❑ the best route to take;
- ❑ whether or not to share a car with someone else;
- ❑ whether or not to go to an alternative destination; and
- ❑ whether or not to abandon the journey;

At its most basic, traffic and travel information provides essential data to warn of hazards or to advise of speed–limits, directions or restrictions and other alternatives. More advanced information can be provided before and during a journey to assist travellers and could include:

- ❑ current and predicted transport network conditions;
- ❑ expected disruption, if any, to the journey;
- ❑ alternative modes of transport with relevant journey details;
- ❑ alternative routes for any given mode; and
- ❑ alternative times for public transport journeys

There are essentially three ways in which information can be presented to travellers. One is by providing information en–route via signs at the roadside with fixed or variable messages. The others are by using radio or other advanced communication technologies to provide information in the vehicle itself or to provide advance pre–trip information, to enable users to make travel–choices prior to starting their journey.

15.2 Role of Signing in Traffic Management and Control

Signs and road markings are a visual means of conveying information to a driver relating to the highway on which he or she is travelling, or wishes to travel, and should promote the safe and efficient use of the highway. The information has to be seen, read, understood and acted upon in a short period of time and so must be presented in as clear and concise a manner as possible. To achieve this, a range of standard sign–types has been developed for rapid assimilation by drivers (see Section 15.4).

Under the Vienna Convention (1968), a similar style of signing has been adopted throughout most of Europe and drivers should be able to understand the basic meaning of a sign in any European country. Recent developments in microprocessor control and matrix displays have provided greater flexibility in the way information can be disseminated. Known by their generic name of Variable Message Signs (VMS), these signs are able to display a variety of symbols and textual messages, including colour representations of mandatory signs.

15.3 Principles of Signing Road Traffic

Careful provision of prescribed signs and markings can make a considerable contribution to the safe and efficient operation of the highway network.

Traffic signing is effected by the use of road markings, road studs, traffic signals, lamps, cones, cylinders and beacons, as well as by various types of upright signs with textual or graphical images (see sections 64 to 80 of the Road Traffic Regulation Act 1984) (HMG, 1984) [NIa].

The circumstances in which each of these devices is permitted, or required to be used, and illustrations of most of them are contained in the current Traffic Signs Regulations and General Directions (TSRGD) (HMG, 1994) and subsequent amendments (HMG, 1995) [NIb]. Detailed specifications of most prescribed signs are given on working drawings published by the Stationery Office (HMG, 1994/95) [Wa]. Advice on the use and design of signs is given in the Traffic Signs Manual (DOT/TSM), supplemented by Department of Transport Circulars (DOT, 1995) [Sa] Advice Notes and Standards and Local Transport Notes (DOT, 1987; 1994a and 1994b) [Sa].

Generally speaking, all traffic signs used on the highway must conform to the Regulations, which are periodically updated, but special signs can be individually authorised by the Secretary of State in appropriate circumstances.

Signs should be sited so that the information is given to road–users precisely when they need it; neither too soon, lest it be forgotten before it is needed, nor too late for the safe performance of any consequent manoeuvre. Appropriate signing, therefore, needs to take account of how fast traffic is travelling. Subject to the siting constraints for different types of sign, they should not be placed so as to be environmentally intrusive and cause sign clutter. Further information on the size, design and mounting of traffic signs is given in the Traffic Signs Manual (DOT/TSM).

Signs which do not conform to the appropriate regulations, or are unauthorised signs or advertisements, may distract the attention of road–users to the detriment of road safety (DOE, 1984) [Sb]. They might also be held by a court to be unlawful obstructions of the highway.

15.4 Categories of Traffic Signs

Apart from traffic signals, which are discussed in Chapter 18 and Part 5, traffic signs may be divided into three broad categories. These are:

- ❑ upright signs – which are themselves divisible into warning, regulatory and informatory signs (Schedules 1 to 5, 7, 10 and 12 of TSRGD) (HMG, 1994) [NIc];
- ❑ road markings (Schedule 6 of TSRGD) (HMG, 1994) [NId]; and
- ❑ miscellaneous signs, including traffic–light signals (Schedules 8, 9 and 11 of TSRGD) (HMG, 1994) (see also DOT/TSM) [NIe].

Warning signs, which give warning of hazards ahead, are usually either triangular (black symbol within a red border) or rectangular (white legend on a red background). The latter are used mainly for temporary warnings. A variety of supplementary plates, giving further information, is available for use with certain prescribed warning or regulatory signs.

Regulatory signs give notice of restrictions or prohibitions on the speed, movement and waiting times of vehicles. They are mostly circular with a red border, indicating a negative instruction, or a blue background, indicating a positive instruction. Exceptions are the 'Stop' sign (octagonal) and the 'Give Way' sign (inverted triangular). Waiting restrictions and zonal restrictions signs are rectangular. Most regulatory signs may be used only if an appropriate Traffic Regulation Order (TRO), such as a one–way street or no–waiting restriction, has previously been made by the local traffic Authority (see also Chapter 13) but some can be used without an Order, for example 'Give Way', 'Keep Left' or 'Keep Right'. 'Stop' signs do not require an Order but do require the consent of the Secretary of State. Supplementary plates may also be used and must accord with any associated Traffic Regulation Order, such as 'except for access' or 'except for loading'.

Information signs give information about routes, places and facilities of particular value and interest to road–users. Directional signs come into this category; they are either rectangular or 'flag' type (ie pointed at one end). The colours used depend on the road on which they are used and the information they give (see Section 15.5).

Road markings are provided to convey a warning, a requirement or basic information. They are usually white, except where associated with waiting or loading restrictions, in which case they are yellow, except for the London Priority (Red) Routes, which use red lines. In certain circumstances, regulations require that reflecting material should be used (HMG, 1994). Studs incorporating reflectors may be provided to supplement road–markings. Reflectors are usually white in colour but red, green or amber studs may also be used, depending on their location on the carriageway.

Apart from traffic signals, other miscellaneous signs include:

- ❑ temporary signs placed on or near a road to warn, inform or regulate traffic for special events, roadworks or other temporary situations;
- ❑ flashing beacons (usually amber or, in the case of police, blue), warning drivers to take special care (eg beacons at fire stations and level crossings);
- ❑ cones used to define routes around obstructions or road–works;
- ❑ cylinders indicating the temporary division of a carriageway;
- ❑ indicator lamps at refuges, to warn drivers of their presence;
- ❑ school crossing–patrol signs and warning lights; and
- ❑ flashing amber danger lamps, to define the extent of a temporary obstruction.

15.5 Direction Signing

Hierarchy

Direction signing is used to guide drivers to their destinations by the most appropriate routes. The broad approach adopted in Britain is first to guide traffic towards a general destination then, at the appropriate point, to direct it to more specific areas and finally to local destinations. These may be simply

street name–plates (though street name–plates and house numbers are not classed as traffic signs) or could, in the case of important traffic attractors, be individual buildings or car parks. Signing, therefore, becomes increasingly specific, moving down a hierarchy of destinations, as decision points are reached.

The hierarchy of destinations used is:

- ❑ 'regional' destinations – major geographical areas such as 'The North' and 'The South West' (DOT, 1994a) [Sa];
- ❑ 'primary' destinations – such as important locations on the motorway and primary route network, and towns and cities which are important destinations for longer–distance traffic;
- ❑ 'non–primary' destinations – towns and smaller cities of less importance to traffic;
- ❑ 'local destinations' – such as small settlements, city suburbs, environmental areas, industrial estates and destinations such as transport interchanges or other public buildings, which may be significant attractors of traffic; and
- ❑ 'tourist' attractions and facilities – attractions with over 150,000 visitors a year, and which meet certain other criteria, may be signed from the nearest motorway junction(s) within 20 miles [NIf]. On all–purpose roads, tourist signing should be in accordance with criteria set by the Local Authority and may include signing to all tourist destinations which attract visitors to an area (DOT, 1995) [Wb].

Colours

The colours used for direction signs depend on the status of the traffic route on which they are placed and the type of information given. A detailed explanation of the colour coding of direction signs can be found in LTN 1/94 (DOT, 1994a) [Sa]. A multi–tier system is used in Britain, as follows:

- ❑ on motorways – blue background with white border, symbol, legend and route number – main destinations;
- ❑ on the primary route network – green background, with white border, symbol and legend, and yellow route number. Note that a primary route is not a road classification as such but rather a route designated, by the Department of Transport, as the most appropriate between places of major traffic importance. These signs help drivers to identify, and follow, the primary route network;
- ❑ on non–primary routes – white background with a black border, symbol, legend and route number. These signs are used on all roads which are not part of the motorway or primary route network;
- ❑ tourist attractions and facilities – brown background with a white border, symbol, legend and mileage. Approved symbols may be used to denote the type of attraction or facility. These signs can be used on all classes of road including motorways (DOT, 1995). Traffic signs on trunk roads and motorways, to tourist attractions and facilities in England, must follow the criteria of the Highways Agency [Wc]. It is common practice for the applicant to pay the cost of designing, erecting and maintaining tourist signs; and
- ❑ traffic diversions – signs using a yellow background with a black border, symbol and legend are for temporary use, most commonly in connection with a diversion caused by road–works or when used by a motoring organisation, such as the Automobile Association (AA), for directions to a specific event, subject to approval by the local traffic Authority. Temporary signs can also bear a blue legend on a white background or a white legend on a blue background,as normally used by the Royal Automobile Club (RAC) (see Regulation 41 of TSRGD) (HMG, 1994).

In addition to the above signs for general traffic, other colours can be used for specific themes. These include lorry routes (black background with a white lorry symbol), pedestrians (blue background with a white symbol of a walking man) and cyclists (blue background with a white cycle symbol). See the Traffic Signs Regulations and General Directions 1994 (HMG, 1994) for further information.

Location

The choice between three types of direction sign depends on where they are to be sited in relation to junctions. An 'Advance Direction Sign' (ADS) is placed before a junction is reached, to give drivers advance information about their possible route–choices. On high speed roads, a 'Forward ADS' may be provided some distance ahead of the ADS and, on motorways, signs are provided one mile and half a mile ahead of, as well as at, the exit itself. Tourist signs on motorways may be provided, if appropriate, ¾ mile and ¼ mile in advance of the exit. Advance direction signs may be mounted overhead on bridges or gantries or by the side of the carriageway.

The layout of individual advance direction signs may be of the map–type, where the layout of the junction is represented diagrammatically. These are especially appropriate at roundabouts and may display other indications to traffic, by incorporating certain warning or regulatory signs. They may also be of the stack–type, where the individual destinations are stacked above each other on the sign face, or the lane–destination type, where the carriageway is clearly marked into traffic lanes, which are appropriate for different destinations.

A 'Direction Sign' (DS) repeats the information on the ADS but is placed at the junction where the turning manoeuvre is actually to be made. Direction signs are normally of the flag–type but may incorporate an inclined arrow, depending on the type of junction.

A 'Route Confirmatory Sign' is placed after the junction, to give confirmation of the route number and the distances to major destinations ahead.

A 'Boundary' or 'Place–Name Sign' complements the direction signing system, by informing drivers that the destination previously signed has been reached. Additional information signs, such as for rivers and county boundaries, assist travellers in locating their position and correspond with information commonly found on road maps.

The precise layout, design and siting requirements for the different types of direction signs are given both in the Department of Transport's Traffic Signs Manual (DOT/TSM) and in Local Transport Notes 1/94 (DOT, 1994a) and 2/94 (DOT, 1994b). General points (DOT, 1994a) [Sa], which should be followed as far as possible, are:

- ❑ once a destination has been signed, all subsequent signs along that route must indicate that destination until it is reached;
- ❑ the number of destinations shown on any one sign should not exceed six, preferably not more than five on motorways;
- ❑ not more than two destinations should be signed in each direction on any one sign. Exceptionally, a third destination may be used but only if absolutely necessary;
- ❑ destinations should not be signed beyond a destination of a higher category in the hierarchy;
- ❑ mileage to destinations should not normally be shown on ADSs but may be shown on DSs within junctions, unless indicated on a following route confirmatory sign;
- ❑ route numbers should appear on both ADSs and DSs, unless they are of purely local significance;
- ❑ signs should be sited where there is good visibility for approaching drivers and away from vegetation, which may grow to obscure them; and
- ❑ the size of signs and lettering should relate to 85 percentile traffic speeds, to ensure legibility from an adequate distance and to allow drivers time to react and to take appropriate action safely.

15.6 Variable Message Signs (VMS)

Variable message traffic signs have been in use for many years but the introduction of microprocessor control and matrix displays has provided increasing opportunities for their use in the management of traffic.

Advice on suitable applications for VMS, criteria for selecting the most suitable type of sign, operating methods and standards can be obtained from the Design Manual for Roads and Bridges, Volume 8 (DOT, 1990).

Regulation 46 of the TSRGD (HMG, 1994) provides that variable message signs may display either signs shown in Schedules 1 to 5, 7, 11 or 12 or the range of messages prescribed in Schedule 15 [NIb]. Any signs not included in these Schedules must be authorised by, or on behalf of, the Secretary of State. Applications for authorisation should, in the first instance, be addressed to the relevant Government Regional Office or the Highways Agency for trunk roads in England [NIg] [Sc] [Wd]. As more experience of VMS is gained the range of prescribed messages is likely to be increased in Amendment Regulations.

Authorisation is required for:

- ❑ the location of the sign(s);
- ❑ the size, colour and character of the sign(s);
- ❑ the display characters (if not the standard character in Schedule 13 of TSRGD); and
- ❑ the legends proposed for display using the above characters.

The Traffic Signs Regulations and General Directions (HMG, 1994) also require that the equipment used for all variable message signs be of a type authorised in writing by, or on behalf of, the Secretary of State before being placed on, or near, any road.

This authorisation is commonly referred to as 'Type Approval' and is usually held by a manufacturer for each type of sign produced. If an engineer specifies signs of a novel design, the manufacturer may need to obtain a specific Type Approval from the Department of Transport [NIg] [Sc] [We], which can take several months. Allowance for this should be made in the contract programme.

The main types of variable message sign technology are described in Section 6 of Chapter 18. VMS can be beneficial in a variety of situations, either where a message is not required to be displayed permanently or where several alternative messages, which are not interdependent, are required at the same site under different circumstances. The following are examples.

Regulatory signs (time–dependent, tidal and peak–hour schemes) such as:

- ❑ banned turns;

- ❑ no entry;
- ❑ restricted access (eg pedestrian zones);
- ❑ lane–control (eg tidal flow);
- ❑ warning signs;
- ❑ over–height vehicles (in conjunction with diversion signs);
- ❑ gate(s) closed; and
- ❑ weather related (eg flood, fog, ice/snow, wind).

Informatory signs, such as:

- ❑ route–status, providing information about prevailing route conditions, such as incidents and roadworks (see Photograph 15.1);
- ❑ car parks, where matrix signs can display the actual number of vacant spaces in real–time, when linked to a monitoring system, such as UTC (see Photographs 15.2 and 15.3);
- ❑ direction signs, which show major destinations;
- ❑ diversions (see Photograph 15.4);
- ❑ lane–controls;
- ❑ facilities/services (eg open 24 hours or closed); and
- ❑ motorway services, petrol–price signs.

Warning signs, such as:

- ❑ detection of over–height vehicles approaching a bridge; and
- ❑ detection of long vehicles crossing a carriageway at a junction ahead.

15.7 Illumination of Traffic Signs

The requirements for the illumination of signs, whether internal, direct external or by reflectorisation, are contained in Regulations 18–21

Photograph 15.1: An example of a route–status information system.

Photograph 15.2: An example of car parking information with real–time data on vacant spaces.

and Schedule 17 of the current Traffic Signs Regulations and General Directions 1994 (HMG, 1994) [NIh]. TA 19/81 (DOT, 1981) gives guidance on the use of different types of reflective material. The illumination requirements for traffic signs are related to whether or not a system of street–lighting, as defined in Schedule 17 of TSRGD 1994, is present within 50m of the sign. In general, all motorway directional signs should be directly lit, even in areas with street–lighting. The requirement also to light primary route signs is left to the discretion of the engineer, after considering the position of the sign and the materials to be used in its construction. The precise lighting requirements for all prescribed signs

Photograph 15.3: An example of car parking information with real–time data on vacant spaces.

Photograph 15.4: An example of a temporary diversion information sign.

are found in Chapters 1 to 8 of the Traffic Signs Manual (DOT/TSM). The current Traffic Signs Regulations and General Directions (TSRGD) should be consulted, since requirements change from time to time.

All other direction signs must be 'reflectorised', if not directly lit, except signs for pedestrian and cycle routes and tourist attraction signs, where reflectorisation is not required by the regulations but is nevertheless generally recommended.

15.8 Environmental Impact of Direction Signs

The number and size of direction signs should be kept to a minimum, commensurate with the need to provide adequate information for drivers. The location of direction signs should take account of other prohibitory signs, traffic signals, street name–plates and other street furniture. Sign supports should also be designed with care, to avoid ugly and overlarge structures. In dense urban areas, it is sometimes difficult to find suitable locations for signs, especially where footways are narrow, and it may be necessary to compromise on the number of signs provided. In these cases, directional signs should take precedence over other informatory signs but not over regulatory signs. Special treatment may be necessary in conservation and other environmentally–sensitive areas to consider, for example, cast fingerpost signs rather than standard direction signs.

15.9 Traffic Signs at Roadworks

Proper temporary signing is mandatory at roadworks, to give adequate warning to drivers and to enable them to take appropriate action. Consistent application of good temporary signing practice will help achieve high standards of safety at roadworks. To this end, the Department of Transport has set out detailed requirements for the layout and siting of temporary signs for different types of roadworks in Chapter 8 of The Traffic Signs Manual (DOT/TSM) [NIi]. These requirements cover all aspects of temporary traffic arrangements, including detailed layouts and recommendations for the use of cones, cylinders and temporary lighting. Working drawings for all signs required for road–works are available as a package (HMG, 1994/5 – Vol 3) [Wf].

Under the New Roads and Streetworks Act 1991 [Nij] certain undertakings must, by law, conform to the signing provision in the Code of Practice on Roads and Streetworks (DOT, 1992).

15.10 Design of Signs

The requirements for the design of direction signs are given in the Traffic Signs Regulations and General Directions 1994 (HMG, 1994) [NIh] and Local Transport Notes (DOT, 1994a and 1994b) [Sc]. The Department of Transport has also published working drawings for traffic signs and these can be used with computer–aided design (CAD) systems to produce individual designs (HMG, 1994/5) [Wg].

15.11 In–Vehicle Information Systems

Information can be presented to the driver in a vehicle in a number of ways. The most popular form of in–vehicle travel news is provided by standard radio broadcasts. All local, regional and national radio stations carry regular travel bulletins. Broadcasters obtain information through regular contact with local highway authorities,with local and regional police and with public transport control centres, or by electronic exchange of travel information between these organisations.

All methods of information provision should be relevant, timely and accurate, in order to maintain

credibility with users. Effective use of the media is particularly important when planning road–works that may disrupt traffic.

One dedicated in–vehicle travel information system, widely used in the UK is 'Traffic*master*'. This is a commercial system that uses a large network of infra–red detectors placed at strategic locations on the UK motorway and trunk road network to monitor traffic speed. These detectors relay information on slow–moving traffic, via a control centre, to small in–vehicle units, where they are displayed on a digitised map of the motorway and trunk road network. Drivers are thus forewarned of potential problems on their journey and can then decide on their best course of action (see Section 18.12).

The Radio Data System (RDS) is a development of the standard radio broadcast system, based on technology to carry additional digital data in tandem with normal broadcasts. This additional data can take the form of text–based information like teletext, for example, to show the name of the broadcast station on the radio display. It can also take the form of control codes, which can provide instruction to the radio receiver. During travel news bulletins, for example, a radio station can simultaneously transmit control codes to indicate that travel news is being transmitted. These control data are picked up by the radio receiver, which then automatically interrupts whatever is currently being played (radio, cassette, or CD) to broadcast the bulletin. Similarly, control data can be transmitted to indicate when the broadcast is over and thus return the receiver to whatever was originally being played.

The Traffic Message Channel (TMC) is an additional feature of RDS. It extends the use of the data transmission capability to provide encoded travel messages, which are decoded by the in–car radio receiver, and either displayed as text on the receiver's digital display or, when used alongside a voice synthesised database, played back as an audio message. The messages are encoded using a European standard protocol known as ALERT C+. Any organisation with the relevant software can construct and transmit a travel message, using the ALERT C+ protocol. Cooperation with radio broadcasters will provide the necessary transmission technology. Encoded travel messages can then be forwarded by the organisation to the transmission point and broadcast to travellers. The messages can be filtered to provide information for the chosen route only and can be in the driver's native language.

Digital Audio Broadcasting (DAB) offers the prospect of improved transmission capacity and scope for dynamic (ie. interactive) information provision, through a Europe–wide DAB–TMC network.

15.12 In–Vehicle Navigation Systems

In–vehicle information can be provided through the use of route–planning and navigation systems. There are basically two kinds of route–guidance system – autonomous (ARG) and dynamic (DRG). Both make use of digitised road maps within the receivers. Some autonomous systems allow the selection of journey parameters, such as origin, destination and arrivsal time; a preferred route is then calculated, usually based upon time or distance criteria. Others combine the use of digitised mapping with terrestrial or satellite navigation services. These pinpoint the location of the car in relation to the chosen route and guide the driver, using simple visual and/or spoken instructions at relevant moments (eg 'take the next left turn' or 'stay in the right–hand lane'). Additionally, dynamic systems incorporate real–time information. The calculated route depends on actual traffic conditions and may be recalculated in response to these and other incidents during the journey.

Fully dynamic route–guidance (DRG) systems rely on loops, infra–red or microwave beacons or digital cellular telephone (GSM) to provide a two–way communication link between vehicles and the roadside. The basis of these systems is that equipped vehicles act as 'floating cars' and report their journey times on roads back to a control centre. The information from all equipped vehicles can then be collated at the control centre, to provide a continuously–updated picture of traffic conditions over the entire network. When a driver requests a route, this is effectively computed at the control centre, taking into account overall network conditions prevailing at that time.

15.13 Electronic Pre–Trip Information Systems

The circumstances under which pre–trip information is used vary considerably, depending on the type and destination of information to be distributed and the type of recipient. Pre–trip information is needed in three broad locations:

- ❑ in the home;
- ❑ in the office and similar workplace; and
- ❑ on–street or in other public places.

Many of the systems provide information on a range of travel modes, which gives travellers the

opportunity to seek alternative arrangements for any given journey, particularly for public transport trips. They also help travellers to make a particular journey using more than one mode of transport.

No statutory guidelines exist, as at 1997, on the introduction of pre–trip information services, other than the requirement for planning permission for on–street information provision. However, foremost in the provision of pre–trip information is the requirement for source information of the highest quality.

A range of media exists by which electronic pre–trip information can be disseminated. The list below provides an indication of the methods available. These are:

- ❑ television and teletext (cable/satellite/terrestrial);
- ❑ radio broadcasts;
- ❑ telephone and fax services;
- ❑ on–street displays and terminals; and
- ❑ computer network systems.

It may be possible to make use of existing communications infrastructure, such as via television/teletext and radio broadcasts, in order to disseminate information. This provides the most widespread coverage to the population but is likely to require at least some form of communications link to the main broadcaster, as well as an information dissemination system, such as dedicated PC software. Portable electronic travel–guides are also under development, based on 'palm–top' micro–computers.

Telephone services offer easy accessibility to travel information, as the majority of the population own, or have access to, a telephone. A wide range of telephone services is available, including pre–recorded message services and fax services. Consideration has to be given to the level of service offered, the expected demand, publicity and whether the service is expected to generate revenue (eg using premium–rate lines).

Trip–planning information systems have been developed which enable pre–trip planning of journeys, made by public or private transport, to utilise the network more efficiently. If the aim is to promote the use of public transport, then a multi–modal trip–planning facility should be adopted. This allows enquiries involving combinations of bus, train, aeroplane or ferry to be processed, thus avoiding the need to search through a series of timetables or make a number of telephone calls to obtain the required information.

Before offering such a trip–planning facility, permission must first be obtained from all public transport operators whose information is required, to produce the database for the catchment area under consideration. Any subsequent alterations to schedules must be notified as soon as these become available, to prevent out–of–date and inaccurate information being provided to travellers.

Commercial software packages provide nationwide trip–planning facilities by road and rail. Less commonly, packages are available for bus journeys within geographical limits. The software can be used as–purchased or may be modified and combined with other software to provide multi–modal information. However, public access to these packages usually requires the payment of an annual licence fee to software copyright–holders.

Terminals holding the information can be touch–screen or keyboard operated and should be located in places of high public usage, such as major transport interchanges (rail or bus stations, ferry terminals, airports), shopping centres, hospitals, libraries and tourist information bureaux. Permission must be sought from site–owners prior to the installation of such a system. Other useful facilities which could be incorporated include a printer to enable a record of the journey to be obtained and a 'through the glass' terminal which is accessible 24 hours a day. An example of a trip–planning system is shown in Photograph 15.5.

Consideration must also be given to the type of

Photograph 15.5: An example of a trip–planning system.

Photograph 15.6: A typical display screen associated with a trip–planning system.

information displayed. This depends largely upon the information–display medium used. Particular attention should be paid to the volume of information which the user is expected to digest and the process by which the user gains access to the information. Circumstances should be avoided where the user is required to search through large volumes of unrelated information in order to get to a relevant section. An example of a typical display screen is shown in Photograph 15.6.

15.14 Bus Passenger Information

The use of real–time public transport passenger information systems for bus services has become an important tool, adopted by local authorities and passenger transport organisations across the UK, to promote the use of public transport.

Such a real–time system can be considered in two distinct parts :

- ❑ vehicle location and communication of data to a central control computer; and
- ❑ communication from control computer and the displaying of real–time information on expected arrivals on electronic message signs. This could be at bus stops or, if intended to influence potential users, at other places such as shopping malls, offices, factories and even in the home.

Vehicle Location (see Section 18.5)

Continuous updating on a vehicle's location can be achieved by a number of means, such as radio–polling, dead–reckoning (beacons and bus–oedometer) or the global–positioning system (GPS). Whichever method is adopted, equipment will be a necessity on board the vehicles to enable location data to be processed and transmitted to a central control computer. Usually, this will involve an on–board computer and radio, although some systems operate without the radio link. If a beacon–based system is used, then planning permission from the Local Planning Authority is required to erect the beacons on existing street furniture, such as lamp columns, and a radio–transmission licence must be obtained, if transmitting power exceeds 500mV.

Transmission of data to the control computer can be via Band III data radio or X25 packet–switched radio. For Band III radio, a licence must first be obtained from the Confederation of Passenger Transport to use a pre–defined frequency/channel. This process normally has to be undertaken by a bus operator participating in the system, as it is difficult for a local authority to be granted such a licence.

Real–Time Information Displays

Various technologies can be deployed to provide real–time information to passengers at bus stops but the value of displaying a conventional, up–to–date printed timetable should not be under–estimated. The alternative sign–types currently available are liquid crystal displays (LCD), light emitting diode (LED) or transflective LCD. The former two are restricted, in terms of their ability to accommodate fluctuations in ambient light conditions, and are, therefore, not very suitable in situations where direct sunlight falls on the screen. However, the transflective LCD reacts to such fluctuations and will adjust its light–output to allow the information on the screen to be legible in all conditions.

'Talking' signs have been developed for visually–impaired bus–users and provide audible, as well as visual, bus information. The signs are activated either by a push–button or a hand–held infra–red key–fob trigger. When active, a digitally–recorded voice announces the approaching bus, the route number, final destination and the estimated time to arrival at the stop.

All displays should be designed to an environmental standard, such as BS EN 60529 (BSI, 1992), which specifies the environmental conditions under which equipment should operate satisfactorily. Signs must also be designed to withstand vandalism and screens should be manufactured from either clear polycarbonate or toughened glass.

While electronic variable message signs could be

Photograph 15.7: An example of real–time 'countdown' information in a bus shelter.

Photograph 15.8: Real–time information on the estimated time to arrival of buses at a particular stop.

installed at a variety of locations, within the bus infrastructure and outside it, the majority have been designed to be installed inside bus– shelters. Shelter manufacturers are tending towards shelters designed with this in mind and, with little or no modification to the unit, a sign can be accommodated safely. However, for older shelters, this is often not possible and, in these situations, replacement with a modified shelter is required (see Photographs 15.7 and 15.8).

The communications network for the signs can be, for example, via radio–paging, low power (up to 500mW) radio or telecommunication land–lines. For radio–paging, a licence will be required and this is issued by the Department of Trade and Industry. No licence is required for low–power radio transmission.

15.15 Rail Travel Information

The majority of rail travel information is provided through paper timetables, available at all railway stations and usually on display at various public places, such as Tourist Information offices in town centres. Information is also provided to travellers through enquiry bureaux at stations and through telephone enquiry services. These can offer person–to–person enquiries or pre–recorded voice announcements. A 'National Rail Passenger Information Service' is in place, following the introduction of a single national telephone number for rail enquiries. Callers whose local enquiry bureau is busy are automatically redirected to unoccupied lines elsewhere in the country.

Other electronic systems are dedicated to the provision of rail information. The main system is that which is used at all main railway stations in the UK and provides on–screen details, on platforms, of current rail network conditions, such as next arrivals and late–running services. Journey–planning software is also commercially available to travellers with access to a computer. Once installed on the computer, it allows each user to enter the details of the proposed journey, such as origin, destination and time of departure, for any train service in the UK. It then calculates the most appropriate journey, based on the shortest overall travel time.

15.16 References

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Note: All current TAs and TDs on traffic signing are now incorporated into the Design Manual for Roads and Bridges (DMRB) Vol. 8 'Traffic Signs and Lighting'.

Also, in DMRB, TA 61/94 'Currency of the Traffic Signs Manual' describes the history and current status of the constituent chapters of the Manual and draws attention to sections which have been superseded by later guidance.