International Standard ISO 4040

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Road vehicles — Passenger cars — Location of hand controls, indicators and tell-tales

Véhicules routiers — Voitures particulières — Localisation des commandes manuelles, des indicateurs et des témoins

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 4040 was developed by Technical Committee ISO/TC 22, Road vehicles, and was circulated to the member bodies in January 1980.

It has been approved by the member bodies of the following countries :

Austria	Japan	Spain
Belgium	Korea, Dem. P. Rep. of	Sweden
Bulgaria	Korea, Rep. of	Switzerland
Chile	Mexico	United Kingdom
China	Netherlands	USA
Egypt, Arab Rep. of	New Zealand	USSR
Germany, F.R.	Romania	
Italy	South Africa, Rep. of	

The member bodies of the following country expressed disapproval of the document on technical grounds :

Australia
France

This International Standard incorporates draft Addendum 1, which was circulated to the member bodies in August 1980, and which was approved by the member bodies of the following countries :

Austria	Japan	South Africa, Rep. of
Belgium	Korea, Dem. P. Rep. of	Spain
Brazil	Korea, Rep. of	Sweden
Czechoslovakia	Netherlands	Switzerland
Egypt, Arab Rep. of	New Zealand	United Kingdom
Germany, F.R.	Poland	USSR
Iran	Romania	

The member bodies of the following country expressed disapproval of the document on technical grounds :

France
Italy

This second edition cancels and replaces the first edition (i.e. ISO 4040-1977).

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Road vehicles — Passenger cars — Location of hand controls, indicators and tell-tales

0 Introduction

There is a recognized potential for errors in the selection of controls essential to the safe operation of a vehicle if these controls are not similarly located in all vehicles. Therefore, the standardization of these control locations must be considered a logical and beneficial design objective since drivers have an ever-increasing opportunity to change from one vehicle to another.

1 Scope

This International Standard lays down the location of the controls in road vehicles, by sub-dividing the space within reach of drivers into specific zones to which certain controls essential to the safe operation of vehicles are assigned.

It also specifies certain combinations of functions for multifunction controls and the degree to which certain indicators and tell-tales shall be visible.

A specification for a control, indicator or tell-tale, does not imply that the item, must be fitted.

2 Field of application

This International Standard applies to hand-operated controls, to indicators and to tell-tales, for left and right-hand drive passenger cars as defined in ISO 3833.

3 References

ISO 2575, *Road vehicles — Symbols for controls, indicators and tell-tales.*

ISO 3833, *Road vehicles — Types — Terms and definitions.*

ISO 3958, *Road vehicles — Passenger cars — Driver hand control reach.*

ISO 4513, *Road vehicles — Method for the establishment of eyellipses for driver's eye location.*

ISO 6549, *Road vehicles — Procedure for H-point determination.*

4 Definitions

4.1 reference plane : Vertical plane parallel to the longitudinal axis of the car, within a zone 50 mm to either side of the centre of the designated seating position for the driver at the R-point[1].

4.2 operational area of a control : Area swept by those parts of a control which are activated by the hand while the possible modes or positions are selected in the manner intended by the designer (see, for example, figure 1).

4.3 display area of an indicator or tell-tales : Area which includes the identification of the quantity displayed and those portions required to determine its level at any point within the usable capacity of the instrumentation. It need not include for example, bezels or the manufacturer's type number (see for example figure 2).

4.4 steering wheel plane : Plane passing through the upper surface of the steering wheel rim in the design condition, as designated by the vehicle manufacturer and the vehicle wheels in the straight head position.

4.5 steering wheel axis : Line at right angles to the steering wheel plane, passing through the centre of rotation of the steering wheel rim.

4.6 zone one : Volume to the left of the reference plane bounded by the following surfaces (see figure 3) :

— a plane parallel to the steering wheel plane and 20 mm above it;

— a plane parallel to the steering wheel plane and 170 mm below it;

— a cylinder which extends 100 mm beyond the periphery of the steering wheel rim and whose axis is on the steering wheel axis;

— a cylinder which lies 130 mm inside the periphery of the steering wheel rim, and whose axis is on the steering wheel axis;

— two planes which intersect along the steering wheel axis, and whose intersections with the steering wheel plane are at 40° and 130° from the reference plane.

1) As defined in ISO 6549.

4.7 zone two : Volume bounded by the following surfaces (see figure 3) :

— a plane parallel to the steering wheel plane and 20 mm above it;

— a plane parallel to the steering wheel plane and 170 mm below it;

— a cylinder of 50 mm radius whose axis is on the steering wheel axis.

4.8 zone three : Volume to the right of the reference plane bounded by the following surfaces (see figure 3) :

— a plane parallel to the steering wheel plane and 20 mm above it;

— a plane parallel to the steering wheel plane and 170 mm below it;

— a cylinder which extends 100 mm beyond the periphery of the steering wheel rim and whose axis is on the steering wheel axis;

— a cylinder which lies 130 mm inside the periphery of the steering wheel rim and whose axis is on the steering wheel axis;

— two planes which intersect along the steering wheel axis and whose intersections with the steering wheel plane are at 40° and 130° from the reference plane.

4.9 visible : Seen with one eye or the other, not necessarily both eyes simultaneously from any position within the 95th percentile eyellipse (see ISO 4513) or the equivalent "V" point to be described in a forthcoming International Standard, with the gear selector in top gear or drive position and the steering wheel in the straight-ahead position.

4.10 head movement : Movement required to overcome a geometric obstruction (for the purposes of this International Standard, it does not include the movement when the target is more than 30° from the line of sight.

4.11 identification : Symbol-written label or some portion of the pointer and scale by which a driver can distinguish the characteristic displayed by the control, the indicator or tell-tale.

4.12 passive restraint readiness indicator : Tell-tale or indicator which indicates a malfunction which will prevent or impede the operation of a passive restraint in the designed manner.

4.13 stalk control : Rigid, elongated control device with a visible length at least five times as great as the least cross-sectional dimension. This device may be fixed or movable and located on the steering column or instrument panel. The operational area is located within the reach of the driver (see ISO 3958).

4.14 touch control : A control requiring minimal displacement to operate.

4.15 proximity control : A control which requires no displacement to operate.

4.16 operational surface : The interface (of the knob, lever, button, etc.) used to activate a control system.

4.17 secondary operational surface : An operational surface mounted on, and external to, another operational surface. This does not include buttons on the end of stalk control. (See figure 4.)

5 Requirements for location of controls

5.1 The operational areas of the following controls shall be located in zone one.

— headlights beam switching;

— optical warning;

— direction indicator.

5.2 The operational area of the following controls, shall be located to the left of the reference plane :

— master lighting control;

— emergency braking control (right-hand drive only).

5.3 A portion of the operational area of a control for the audible warning (horn) shall be located either in zone one or in zone two.

Additional audible warning controls may be located elsewhere, or operational areas of controls may extend beyond these zones.

5.4 The operational area of the following control shall be located to the right of the reference plane :

— emergency braking control (left-hand drive only).

5.5 The controls listed in 5.1, 5.2, 5.3 and 5.6 shall be within the operational reach of drivers as defined in ISO 3958.

5.6 When there is one stalk control, other than the gear selector, in zone 3, it shall operate the windscreen washer and wiper[1]. If there are two or more stalks in zone 3, other than the gear selector, the windscreen washer and wiper[1] shall be controlled by that stalk with its operational area nearest the steering wheel rim.

1) When hand-operated.

6 Requirements for combination of functions into multifunction controls

6.1 The following pairs of functions shall be operated by the same control :

— windscreen wiping on/off and windscreen washing on/off (if power-operated);

— optical warning and headlights beam switching.

6.2 The master lights control shall not be operated by the same control as that for any of the following functions :

— audible warning;

— windscreen wiping;

— windscreen washing;

— direction indicator.

A combination of the master lighting function with these functions is allowed, providing one of the modes to be avoided for the function is chosen for the master lighting function.

7 Requirements for the visibility of display

7.1 The display area of the following display shall be visible without head movement (see figure 2).

— speedometer

7.2 The identification and those parts of the display area required to indicate that a quarter and less of the maximum stored fuel is available shall be visible without head movement for the fuel level indicator (see figure 2).

The remaining parts of the display area shall also be "visible"; for these, head movement is permitted.

7.3 The indication and those parts of the display area required to indicate a critical condition shall be visible without head movement for the following indicators.

— engine oil pressure;

— engine coolant temperature.

The remaining parts of the display area shall also be "visible"; for these, head movement is permitted.

7.4 The identification of the following indicators shall be "visible" without head movement.

— battery charging condition;

— automatic transmission (if mounted on the instrument panel or steering column).

The remaining parts of the display area shall also be visible; for these, head movement is permitted.

7.5 A single zone of at least 18 mm^2 of the illuminated area of the following tell-tales shall be visible without head movement.

— brake;

— parking brake;

— upper beam;

— direction indicator;

— vehicle hazard warning signal;

— seat belt warning;

— passive restraint readiness indicator;

— engine oil pressure;

— engine coolant temperature;

— choke;

— fuel level;

— battery charging;

— automatic transmission (if mounted on the instrument panel or steering column).

The other parts of the display area shall also be "visible"; for these, head movement is permitted.

7.6 If for any of the following functions, there is a master tell-tale which meets the requirements of 7.5 and which is illuminated simultaneously with it, the individual tell-tale need not be visible without head movement.

— brake;

— passive restraint readiness indicator;

— engine oil pressure;

— engine coolant temperature;

— battery charging;

— parking brake.

7.7 When both an indicator and a tell-tale are fitted, it is only necessary to comply with the specifications of one of the sections 7.2, 7.3, 7.4 and 7.5 for each function.

8 Requirements for modes of operation for stalk controls

When functions are operated by stalk controls mounted on or near the steering column (see figure 4), the preferred modes of operation and the modes to be avoided are as given in the following table.

Table

Function	Preferred mode	Modes to be avoided	Secondary operational surfaces to be avoided
Master lighting switching	None	None	Secondary touch or proximity operational surfaces which are not protected from inadvertent operation (i.e. shielding, recessing, sequencing, etc.)
Headlights beam switching	Approximately parallel to the steering wheel axis	Directed towards the steering wheel axis Rotation approximately about the axis of the control	All
Audible warning	None	Approximately parallel to the steering wheel plane Rotation approximately about the axis of the control	All
Windscreen wiping	None	Approximately parallel to the steering wheel axis Directed towards the steering wheel axis NOTE — These do not preclude the automatic operation of wipers when washers are activated	Secondary touch or proximity operational surfaces which are not protected from inadvertent operation (i.e. shielding, recessing, sequencing, etc.) (for on-off only)
Windscreen washing	Directed towards the steering wheel axis or Approximately parallel to the steering wheel axis (to the right of the reference plane only)	None	All
Direction indication	Approximately parallel to the steering wheel plane	All others	All
Optical warning	Approximately parallel to the steering wheel axis	Directed towards the steering wheel axis Rotation approximately about the axis of the control	All

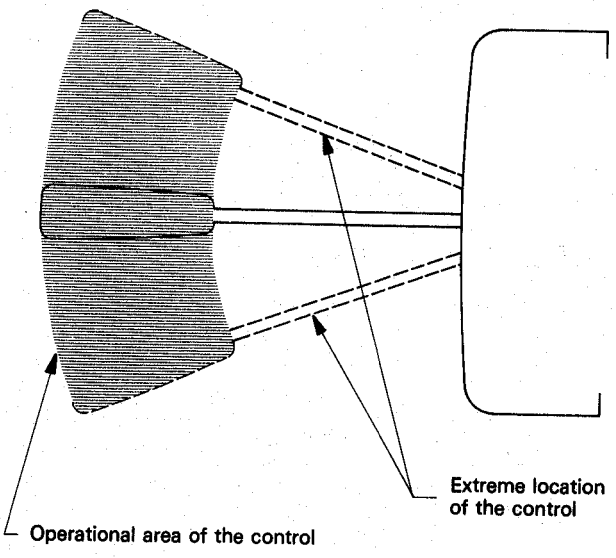


Figure 1 — Example of operational area of a control

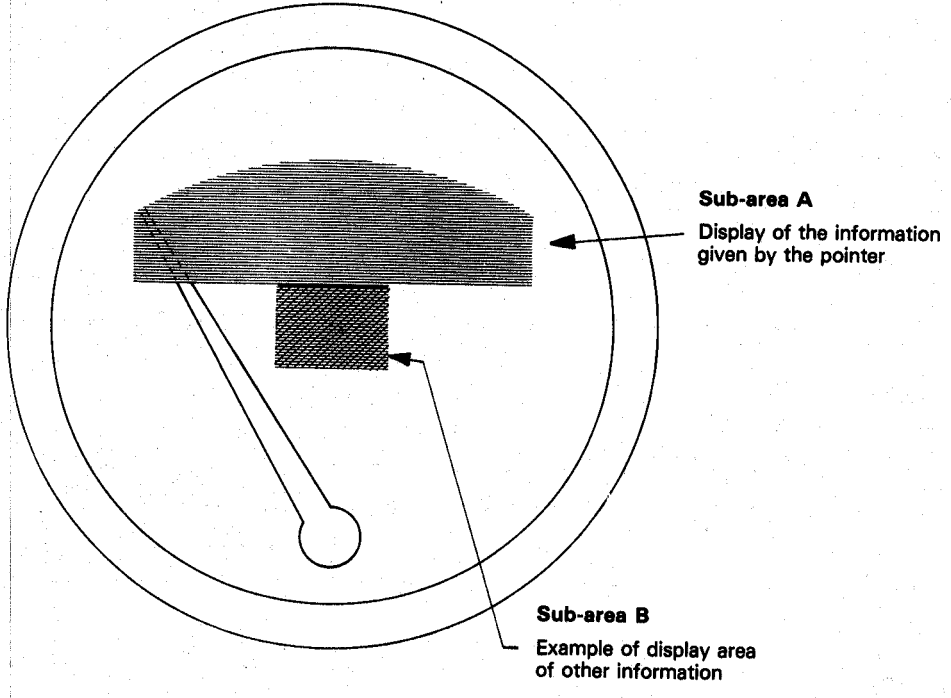
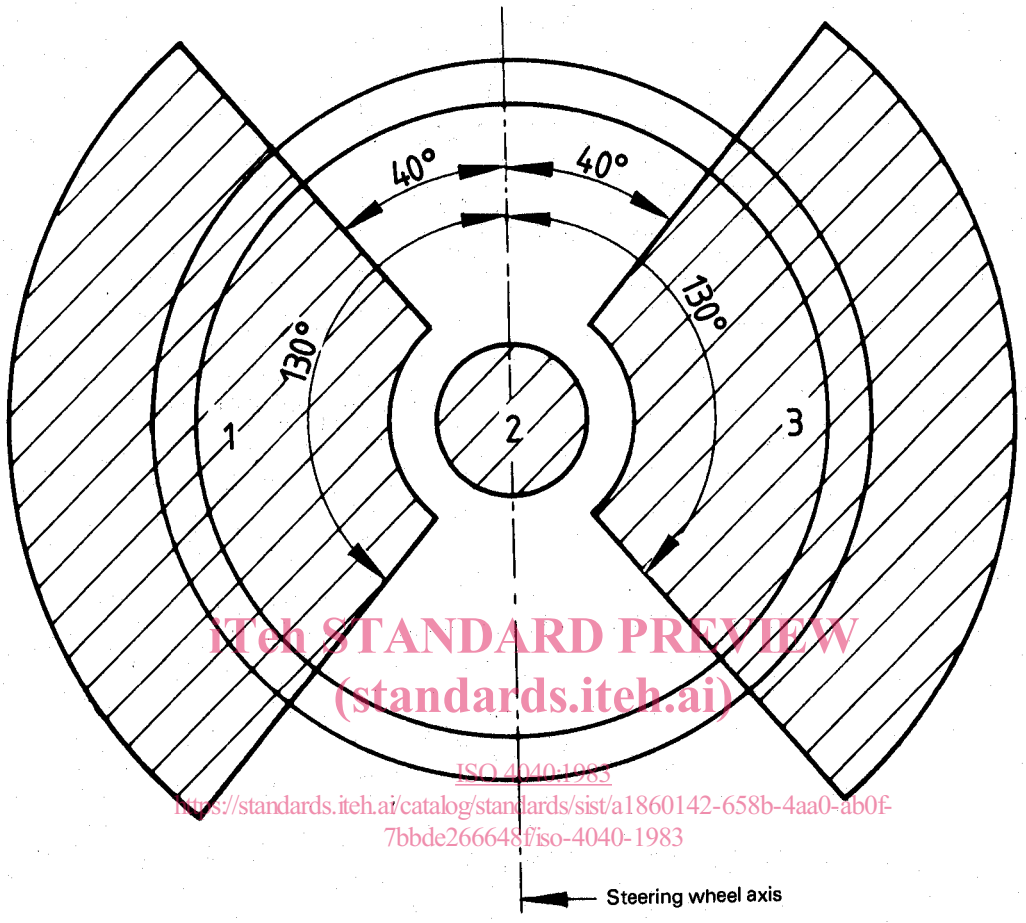


Figure 2 — Example of display area of indicators

Dimensions in millimetres



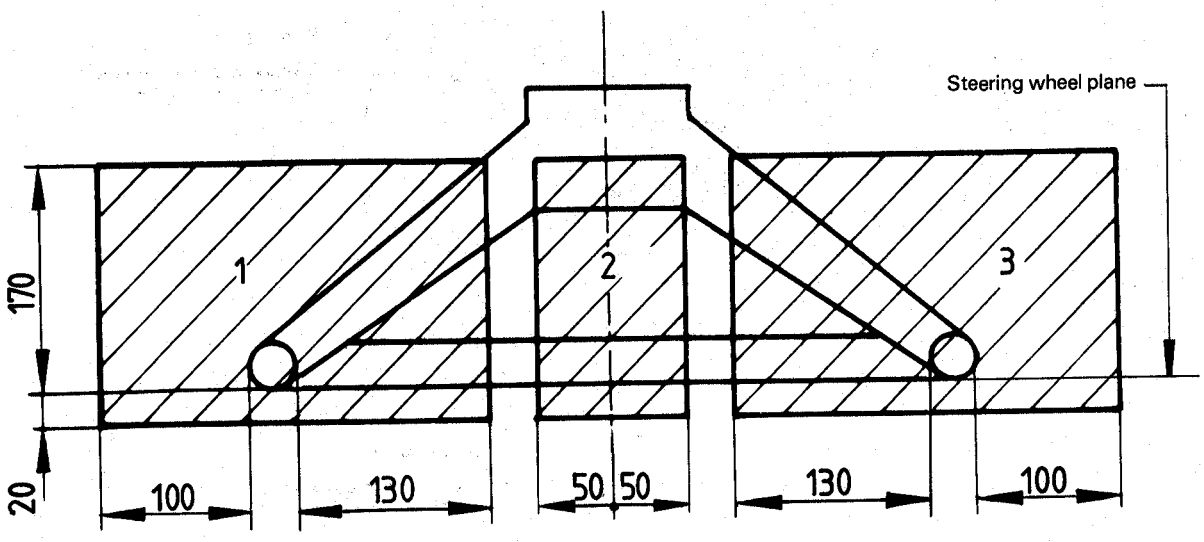


Figure 3 — Location of zones

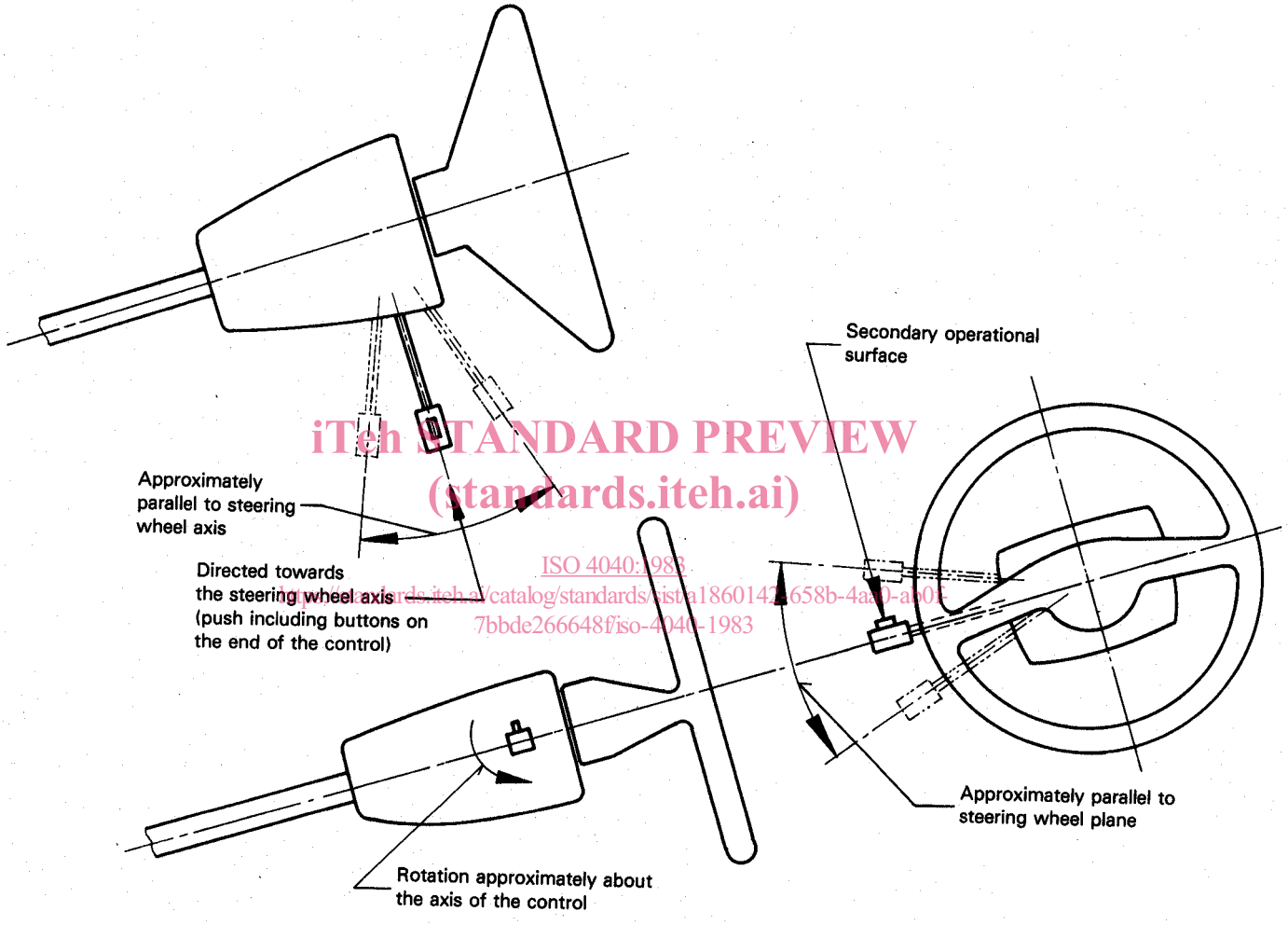


Figure 4 — Modes of operation for stalk controls