

First edition
2003-12-15

**Road vehicles — Gearshift patterns —
Manual transmissions with power-
assisted gearchange and automatic
transmissions with manual-gearshift
mode**

*Véhicules routiers — Disposition de la commande de changement de
vitesse — Boîtes de vitesses à commande manuelle assistée et boîtes
de vitesse automatiques à commande manuelle*



Reference number
ISO/TS 12104:2003(E)

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Published in Switzerland

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 12104 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 13, *Ergonomics applicable to road vehicles*.

Introduction

Electronic controls for vehicle transmissions can make the operation of changing gears for manual and automatic transmissions much more alike. Gear changes in manual transmissions can be made in a similar manner to those in automatics, without the need for a clutch pedal. Conversely, automatic transmissions can incorporate a means for manually shifting between individual gears. When the operation of changing gears is similar for both types of transmissions, drivers expect a similar shift pattern for selecting or changing gears.

This document is published as a Technical Specification because there is controversy about the most appropriate shift direction for fore/aft motion of a floor- or instrument panel-mounted gear lever. Currently, some vehicles use the forward direction of the gear lever for upshifts, while other vehicles use the rearward direction for upshift. National delegations have not achieved consensus on which shift direction to standardize for this particular situation. Consensus has been achieved for all other shift directions shown in Table 1.

TC 22/SC 13 believes that a standard for direction of motion is desirable. Drivers of road vehicles should not have to contend with two opposite shift directions of motion for the floor-mounted lever gearshift controls. Data provided by Japan indicated that there was no stereotype for the upshift direction of motion when gear levers were mounted on the floor and operated in the fore/aft direction. Either direction could have been chosen as the standard. After considering all data and arguments for each direction of motion, SC 13 decided that pull rearward for upshift was the best alternative. By publishing this document as a Technical Specification, SC 13 is giving manufacturers time to provide data to support a different direction of motion, or change their products in order to comply with this Technical Specification.

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Road vehicles — Gearshift patterns — Manual transmissions with power-assisted gearchange and automatic transmissions with manual-gearshift mode

1 Scope

This Technical Specification establishes the shift patterns for manual transmissions with power-assisted gear changes and automatic transmissions with manual-gearshift mode on road vehicles. It also specifies the location of the gear-select and manual-gearshift modes in relation to one another. It is applicable to road vehicles as defined in ISO 3833, excepting motorcycles. It is not applicable to manual transmissions having gearshift patterns without a +/- manual-gearshift mode, nor to displays or tell-tales.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

shift pattern

driver interface indicating the transmission settings, and the arrangement (sequence) of those settings, that are selectable by the driver using the shift control device

3.2

power-assisted gear changes

(manual transmission) gear changes accomplished by an add-on power controller, eliminating the need for driver operation of a clutch pedal

3.3

manual-gearshift mode

gearshift mode, unique in respect of the normal shift pattern, that permits manual upshift (+) or downshift (–) through forward or backward gears using a shift-control device that does not latch in the upshift or downshift setting

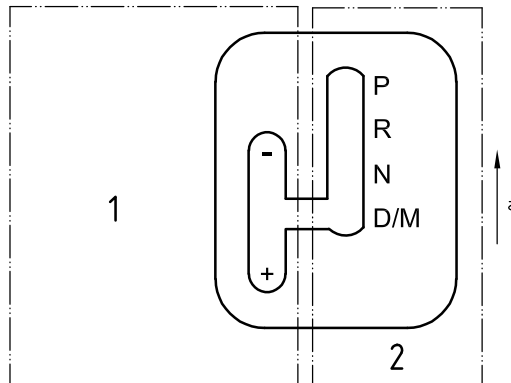
3.4

gear-select mode

mode in which the shift control device is used by the driver to select transmission settings typically used in automatic transmissions (P–R–N–D–L)

NOTE 1 The difference between gear-select mode and manual-gearshift mode is illustrated in Figure 1.

NOTE 2 Gear-select mode includes the operation of switching to and from manual-gearshift mode, but not the operation of changing gears within the manual mode.



Key

- downshift
- + upshift
- 1 manual-gearshift mode
- 2 gear-select mode
- ^a Front of vehicle.

Figure 1 — Example of gear-select mode and manual-gearshift mode — Shift pattern

3.5 shift-control device

part of the gearshift system directly actuated by the driver to select a transmission setting, or to change gears

3.6 automatic-shift manual transmission ASM

manual transmission converted with add-on parts to act like an automatic transmission, while retaining a manual-gearshift mode that does not require a clutch pedal

3.7 manual-shift automatic transmission MSA

automatic transmission with an additional driver-selectable manual-gearshift mode

4 Gear modes

4.1 Gear-select mode

4.1.1 Automatic transmission

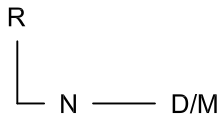
For automatic transmissions, the gear-select mode normally has the shift pattern shown immediately below, from most-forward to most-rearward gear position, clockwise from left to right, or vertically from top to bottom (see, also, Annex A):

- P** (Park)
- R** (Reverse)
- N** (Neutral)
- D** (Drive) / **M** (Manual)

Only gear positions pertinent to the vehicle should be used: letters or numerals may be added or deleted as applicable.

4.1.2 ASM transmission

For ASM transmissions, the gear-select mode shift pattern normally does not provide the "P" (park) position, as in the following example:



Only gear positions pertinent to the vehicle should be used: thus, letters or numerals may be added or deleted as applicable.

4.2 Manual-gearshift mode

4.2.1 In manual-gearshift mode, the direction of motion for the shift-control devices shall be chosen in accordance with one or another of the shift-direction principles given in Table 1. See Clause 5 for examples.

4.2.2 In manual-gearshift mode with a shift control lever employing the fore/aft principle, a line drawn from any point on the shift control in its rearmost (+) position to that same point in the foremost (-) position shall not angle upward more than 40° from horizontal grid, as shown in Figure 2.

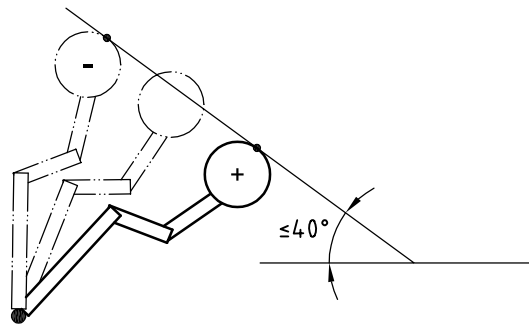


Figure 2 — Movement of shift control from rearmost (+) to foremost (-) position — Maximum side-view angle

4.2.3 If mounted on the steering wheel, shift control devices that follow the left/right or up/down principle will have +/- shifts that invert with more than 90° of steering wheel rotation and are not recommended, unless they are redundant controls.

4.2.4 For symbols for downshift and upshift, see ISO 2575.

Table 1 — Direction of motion — Shift control devices used for manual-gearshift mode

Shift-direction principle	Location in vehicle		
	Floor/Instrument Panel	Steering Column	Steering wheel (true view)
Fore (-) / Aft (+)	Lever (see Figure 3)	Lever/Stalk [see Figure 4 a)]	Lever/Stalk or Pushbuttons (see Figure 5)
Right (+) / Left (-) side	Lever (see Figure 6)	Pull paddles (see Figure 7)	Pull paddles or Pushbuttons (see Figure 8) ^a
Up (+) / Down (-)	Not recommended ^b	Not recommended when steering wheel is angled > 35° from the vertical [see Figure 4 b)]	Rockers or Pushbuttons (see Figure 9) ^a

^a Recommended only as a redundant control (see 4.2.3).
^b A rocker control mounted vertically on a lever is acceptable.

5 Application of shift direction principles for manual-gearshift mode

5.1 General

Sample applications are given in 5.2 to 5.4 to illustrate the shift-direction principles of Table 1. Other applications are possible and are permitted, provided they adhere to the direction of motion principles given in Clause 4.

5.2 Fore/aft

5.2.1 Direction of motion

Upshift is directionally rearward, toward the driver.

Downshift is directionally forward, away from the driver.

5.2.2 Shift lever mounted on floor

The manual-gearshift mode shown in Figure 3 may be located on either the left or the right side of the gear-select mode.

Key

- downshift
- + upshift
- 1 manual-gearshift mode
- 2 gear-select mode
- ^a Front of vehicle.

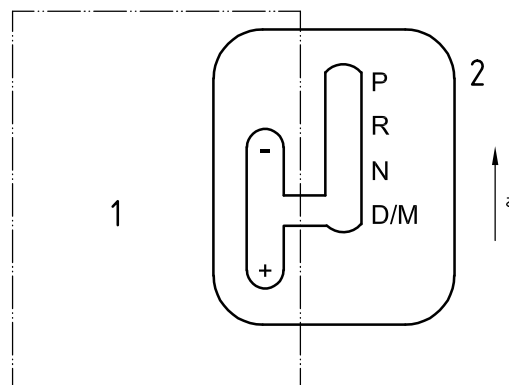
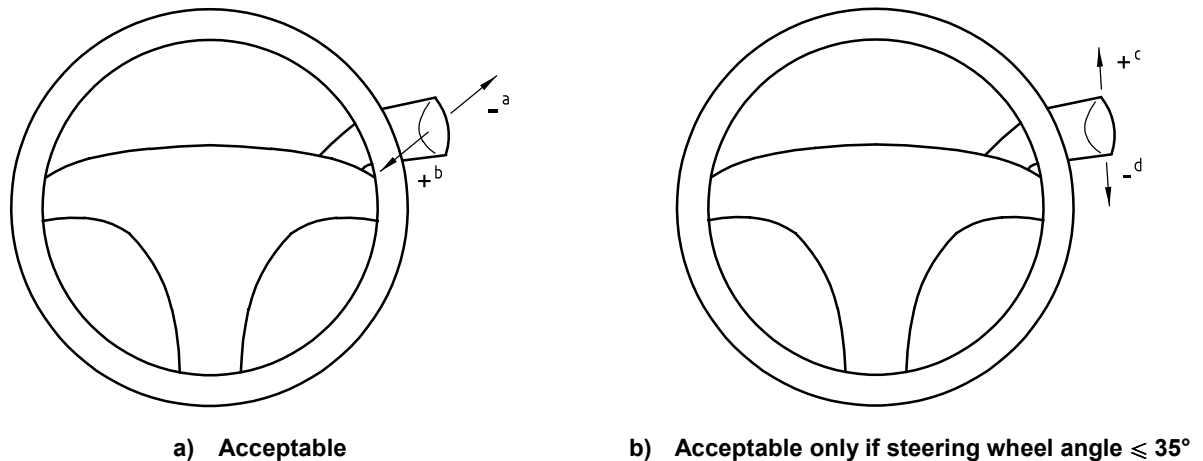


Figure 3 — Fore/aft manual-gearshift mode with lever shift-control device — Shift pattern

5.2.3 Shift lever or stalk mounted on steering column or steering wheel

For a stalk control mounted on the steering column, as shown in Figure 4 a), the upshift (+) direction pulls toward the steering wheel, and the downshift (–) direction pushes away from the steering wheel. Alternatively, as shown in Figure 4 b), it is also acceptable to push up for upshift (+) and down for downshift (–), provided the steering wheel is not angled more than 35° from the vertical. Beyond 35°, the upshift or downshift direction of motion is no longer vertical.



Key

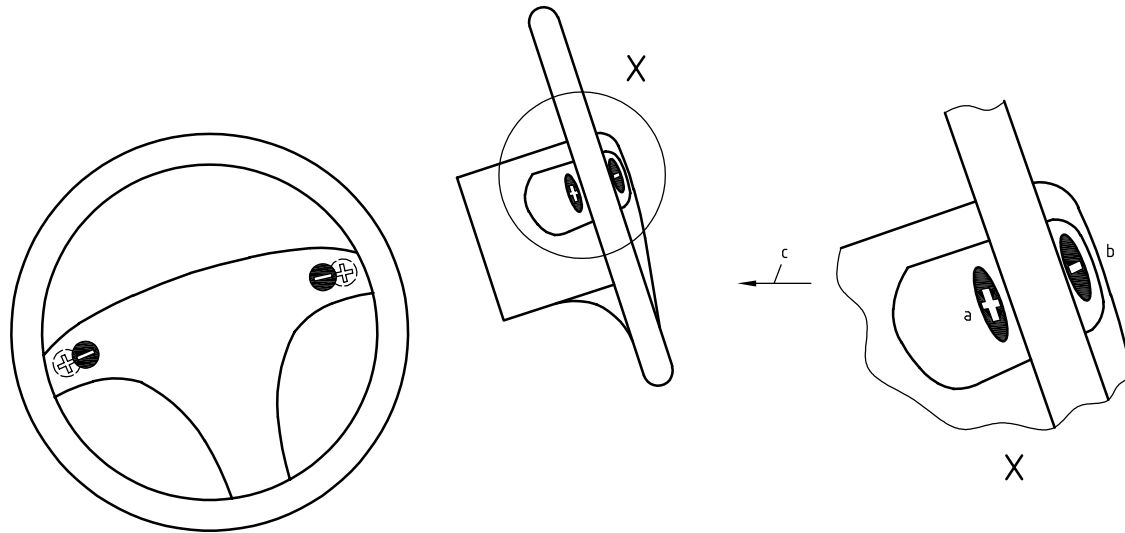
- downshift
- + upshift
- a Push forward.
- b Pull aft.
- c Push upward.
- d Push downward.

Figure 4 — Fore/aft and up/down manual-gearshift mode with lever/stalk shift-control device

5.2.4 Pushbuttons mounted on steering wheel

The pushbutton shift control device shown in Figure 5 may be used as the only +/- shift control, because the fore/aft shift direction of motion does not invert with steering wheel rotation.

For this application, it is acceptable to have only one set of pushbuttons on the steering wheel.



Key

- + upshift pushbutton
- downshift pushbutton
- a Push aft, toward driver.
- b Facing driver: push forward.
- c Front of vehicle.

Figure 5 — Fore/aft manual-gearshift mode with pushbutton shift control device

5.3 Left/right (transverse)

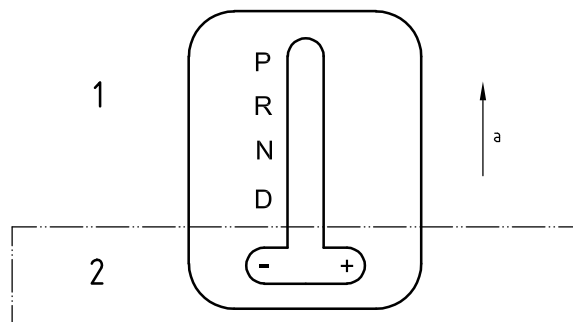
5.3.1 Direction of motion

Upshift is with a right-hand control operation, or toward the right.

Downshift is with a left-hand control operation, or toward the left.

5.3.2 Lever mounted on floor

For manual-gearshift mode with a lever shift control device, the left/right direction of motion is acceptable for downshift/upshift as shown in Figure 6; however, the fore/aft direction of motion according to 5.2.1 is preferred.



Key

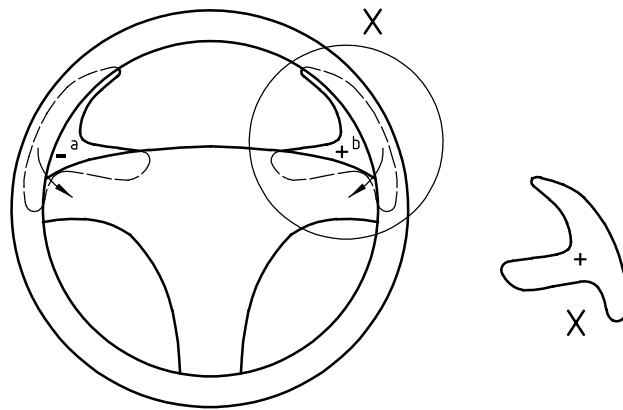
- downshift
- + upshift
- 1 gear-select mode
- 2 manual-gearshift mode
- a Front of vehicle.

Figure 6 — Left/right manual-gearshift mode with lever shift-control device — Shift pattern

5.3.3 Pull paddles mounted on steering column or steering wheel

For manual-gearshift mode with a pull paddle shift control device, both upshifts and downshifts are directionally toward the steering wheel, as shown in Figure 7.

If the pull paddles are column-mounted, the paddles may be used as the only +/- shift control. If the pull paddles are mounted on the steering wheel, the paddles should be used as a redundant control, because the left/right orientation will invert with steering wheel rotation. See 4.2.3.



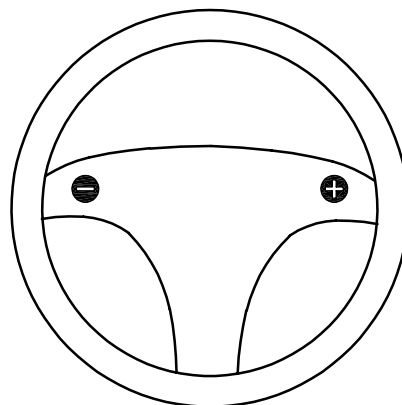
Key

- downshift
- + upshift
- a Pull left paddle.
- b Pull right paddle.

Figure 7 — Left/right manual-gearshift mode with pull paddle shift-control device

5.3.4 Pushbuttons mounted on steering wheel

The pushbutton shift control device shown in Figure 8 should be used as a redundant control, not as the primary or only +/- shift control. See 4.2.3.



Key

- downshift pushbutton (on the left)
- + upshift pushbutton (on the right)

Figure 8 — Left/right manual-gearshift mode with pushbutton shift control device

5.4 Up/down (vertical)

5.4.1 Direction of Motion

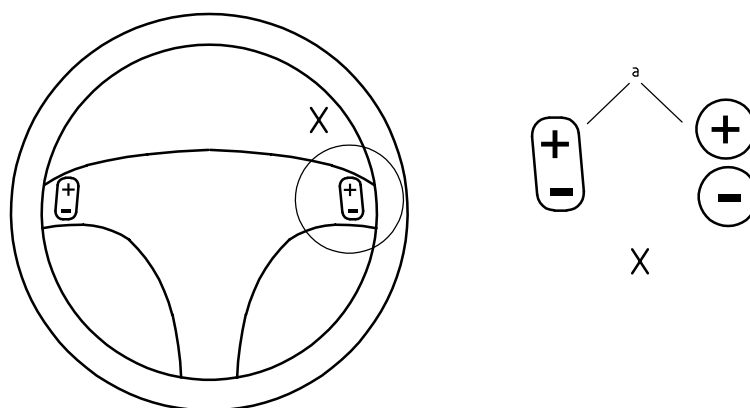
Upshift is the upper button, or upper part of the control.

Downshift is the lower button, or lower part of the control.

5.4.2 Rocker or pushbuttons mounted on steering wheel

The gearshift control device shown in Figure 9 should be used as a redundant control, not as the primary or only +/- shift control. See 4.2.3.

For this application, it is acceptable to have only one rocker or one set of pushbuttons on the steering wheel.



Key

- + upshift
- downshift

^a Optional. Control may be either a pushbutton or rocker.

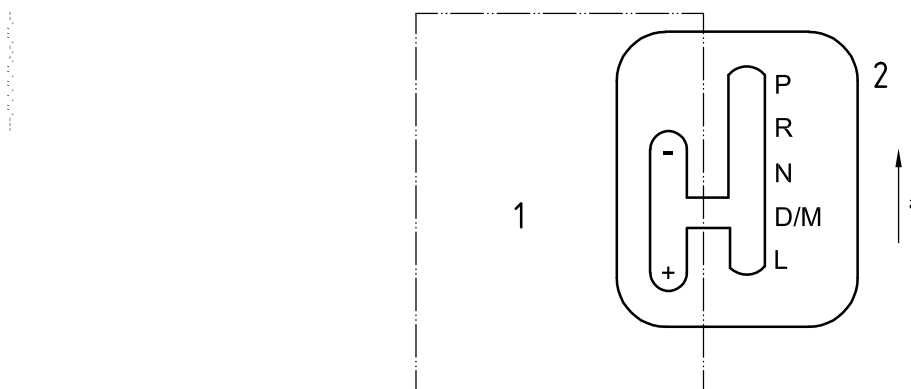
Figure 9 — Up/down manual-gearshift mode with rocker or pushbutton shift control device

Annex A (informative)

Indication of low gear(s) in MSA shift pattern

When MSA transmission gear settings lower than “D” (drive) are labelled with numbers as part of the shift pattern (e.g. PRND4321), the direction of motion for selecting these lower gears can conflict with the direction of motion required for the +/- manual-gearshift mode. In the case of a floor-mounted lever shift control device, the lever is pushed *forward* to downshift in the +/- shift mode. Whereas, in the case of a gear-select mode having a PRND321 shift pattern, the lever is pulled *rearward* to downshift. Either of the following two methods may be used to reduce this apparent conflict in direction of motion.

- Incorporate all lower gear selection into the +/- manual-gearshift mode. In this case, the only transmission settings needed in the shift pattern are P–R–N–D (or P–R–N–D/M).
- Indicate lower gears by using letters or other symbols. For the example of this shown in Figure A.1, gears lower than “L” could be incorporated into the +/- function.



Key

- downshift
- + upshift
- 1 manual-gearshift mode
- 2 gear-select mode
- ^a Front of vehicle.

Figure A.1 — Gear-select mode with additional low gear “L” for lever shift control device — Shift pattern

Bibliography

- [1] ISO 12214:2002, *Road vehicles — Direction-of-motion stereotypes for automotive hand controls*

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