

SPECIFICATION FOR
SPEEDOMETER AND
ODOMETER SYSTEMS
FOR ROAD VEHICLES

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A complete list of British Standards, numbering over 5000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, which may be purchased from BSI Sales Department. It may also be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

BS 84. Parallel screw threads of Whitworth form.

BS 1580. Unified screw threads.

BS 3643. ISO metric screw threads.

BS 3693. Recommendations for the design of scales and indexes. Part 1. Instruments of bold presentation and for rapid reading.

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The following BSI references relate to the work on this standard:
Committee references INE/8, INE/8/1 Draft for comment 69/27186

CONTENTS

	Page
Co-operating organizations	5
Foreword	6

SPECIFICATION

1. Scope	6
2. Definitions	7
3. Speedometer drives	8
4. Drive input for speedometers and odometers (distance indicators)	8
5. Accuracy of odometer	10
6. Accuracy of speed indication	10
7. Cases or other protection	10
8. Installation	11
9. Mounting and overall dimensions (only applicable to heavy commercial vehicles)	11
10. Parallax	11
11. Dial presentation	11
12. Rotation and deflection	11
13. Insulation resistance (only applicable to heavy commercial vehicles)	12
14. Temperature and humidity	12
15. Index stability	12
16. Identification marking	12
17. Type tests	12
18. Routine tests	14

APPENDICES

A. Selection of equipment	14
B. Recommendations on the design and construction of speedometers and odometers	15

TABLES

1. Drives	8
2. Drive input	8
3. Effect of non-standard input on 620 rev per indicated kilometre instrument	9

	Page
4. Effect of non-standard input on 1000 rev per indicated mile instrument	9
5. Accuracy of speed indication of instrument as manufactured	10

FIGURES

1. Drive A. Regular	16
2. Drive B. Snap on (typical representation only)	17
3. Drive C. Light flexible (non-preferred)	18
4. Drive D. Heavy flexible metric	19
5. Drive E. Heavy flexible (applicable to mechanical and electrical types)	20
6. Drive F. For electrical transmitter (flanged)	21
7. Drive G. For electrical transmitter (snout mounted)	22
8. Drive H. Pulse generator	23
9. Socket for connection to electronic speedometers for Drive H	24
10. 148 mm speedometer (mechanical)	25
11. Electronic speedometer (clamp fixing)	26
12. Electronic speedometer (bracket mounted)	27
13. 100 mm/4 in nominal diameter speedometer (electrical)	28
14. Transmitter for speedometers	29

CO-OPERATING ORGANIZATIONS

The Instrument Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

British Calibration Service
 *British Electrical and Allied Manufacturers' Association
 British Industrial Measuring and Control Apparatus Manufacturers' Association
 British Mechanical Engineering Confederation
 British Nautical Instrument Trade Association
 British Railways Board
 British Steel Industry
 Council of British Manufacturers of Petroleum Equipment
 Department of the Environment
 Electrical Research Association
 Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales
 Electronic Engineering Association
 Engineering Equipment Users' Association
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 Meteorological Office
 Ministry of Defence, Air Force Department
 *Ministry of Defence, Army Department
 Ministry of Defence, Navy Department
 National Coal Board
 National Physical Laboratory (Department of Trade and Industry)
 Oil Companies Materials Association
 *Scientific Instrument Manufacturers' Association
 SIRA Institute
 Water-tube Boilermakers' Association

The Government department and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Automobile Association
 Society of Motor Manufacturers and Traders Ltd
 Individual firm

BRITISH STANDARD SPECIFICATION FOR SPEEDOMETER AND ODOMETER SYSTEMS FOR ROAD VEHICLES

FOREWORD

This British Standard has been prepared under the authority of the Instrument Industry Standards Committee. In the preparation of this second edition of the standard account was taken of SMMT Standards Nos. 90, 91, 91A, 92, 103 and 106. This edition of the standard supersedes BS AU 37, 'Dimensions of connections for flexible drives for instruments', BS AU 38, 'Flexible drives for speedometers', and BS AU 70, 'Dimensions of transmitter for speedometers (cradle-mounted: flexible drive)'.

The requirements for speedometer and odometer systems used in private motor cars and light commercial vehicles are somewhat restricted because of the ever-changing styles and requirements associated with these types of vehicles. The requirements for systems for heavy commercial vehicles are more comprehensive and achieve greater standardization. Attention is drawn to the legal requirement that speedometer dials shall be fitted with means of illumination to permit reading at night. It is also a legal requirement that speedometers shall be capable of indicating the true speed at which the vehicle is moving within $\pm 10\%$ at all speeds in excess of 10 mile/h.

For static applications reference should be made to BS 3403, 'Indicating tachometer and speedometer systems for industrial, railway and marine use'.

Guidance of the selection of equipment will be found in Appendix A. Recommendations on the design and construction of speedometers and odometers are given in Appendix B.

SPECIFICATION

1. SCOPE

This British Standard specifies requirements for the drive, coupling and performance of speedometer and odometer systems for heavy and light commercial vehicles and private motor cars.

NOTE. The titles of the British Standards referred to in this standard are listed on page 2.

2. DEFINITIONS

For the purposes of this British Standard the following definitions apply.

- (1) *Speedometer*. A device for the measurement of the rate of distance travelled per unit time.
- (2) *Odometer (distance indicator)*. A counter calibrated in distance travelled.
- (3) *Mechanical speedometer*. A speedometer in which the transmission between the rotating body and the indicator is mechanical.
- (4) *Electrical speedometer*. A speedometer in which the means of transmission and indication are electrical and driven from a generator source.
- (5) *Electronic speedometer*. A speedometer in which the means of transmission and indication are electrical and triggered from a generator source or inductive pickup.
- (6) *Index*. The pointer or other means by which the measured speed is indicated relative to the scale.
- (7) *Scale*. The array of marks together with any associated figuring, with relation to which the position of the index is observed, and from which the indicated speed may be read.
- (8) *Scale mark*. One of the marks constituting a scale.
- (9) *Scale length*. The distance between the centres of the terminal scale marks measured along the scale base.
- (10) *Scale arc*. The angle between the terminal scale marks measured from the index pivot point.
- (11) *Effective range*. That portion of the scale over which the instrument purports to comply with specified limits of error.
- (12) *Amplitude*. In an oscillatory motion, the departure of the extreme point of the movement of the index from the zero or the rest position.

NOTE 1. The amplitude of movement of the index of a measuring instrument may be expressed in terms either of displacement along the index path, or of the equivalent measured quantity.

NOTE 2. The use of the term 'amplitude' in relation to sustained oscillations (e.g. those of a clock pendulum) to signify the total distance between the extreme points of the movement on opposite sides of the rest position is deprecated. It is considered that the present definition (which corresponds with the value of the constant a in the formula $d = a \sin pt$ for a simple harmonic motion) is the better adapted for general use, particularly when regard is paid to the extension of its application to damped oscillations. To avoid the confusion which results from the current use of the term 'amplitude' with two different meanings, it is strongly recommended that the distance between the extreme points of movement on opposite sides of the rest position should be described as 'peak to peak amplitude'.

(13) *Accuracy*. The degree of closeness with which the indications of an instrument approach the true values of the quantities measured.

(14) *Error (instrumental)*. The extent to which indication of an instrument or the result of a measurement approaches the true value of the quantity measured.

(15) *Ranging*. The process of adjusting a measuring instrument so that the instrument error is minimized at one or more values of the measured quantity.

3. SPEEDOMETER DRIVES

The drives given in Table 1 are standard and shall be in accordance with the relevant figure specified.

TABLE 1. DRIVES

1	2	3	4	5
Usage	Drive	Dimensions specified in:	Description	Fig. No.
Private motor cars and light commercial vehicles	A	Inches	Regular	1
	B	(See Note 3)	Snap on	2
	C*	Inches (except where otherwise stated)	Light flexible	3
Heavy commercial vehicles	D	Millimetres	Heavy flexible metric	4
	E	Inches	Heavy flexible	5
	F	Inches	For electrical transmitter (flanged)	6
	G	Inches	For electrical transmitter (snout mounted)	7
	H	Inches	Pulse generator	8

* Non-preferred.

NOTE 1. Notes on the selection of a suitable drive are given in Appendix A.

NOTE 2. Drive D is interchangeable with connections to DIN 75.532, form H2 and E2.

NOTE 3. Drive B is not dimensioned as manufacturers have already developed their own individual designs.

NOTE 4. Details of a suitable socket connection for use with Drive H are given in Fig. 9.

NOTE 5. Details of one type of transmitter (formerly specified in BS AU 70) are given in Fig. 14.

4. DRIVE INPUT FOR SPEEDOMETERS AND ODOMETERS (DISTANCE INDICATORS)

4.1 Standard inputs. Speedometers and odometers shall have the drive input specified in Table 2.

TABLE 2. DRIVE INPUT

Metric units	Imperial units
620/625 rev per indicated kilometre	1000 rev per indicated mile

4.2 Flexible drives. These shall have the same input as given in 4.1.

4.3 Effect of non-standard input. Tables 3 and 4 indicate the effect of non-standard inputs on standard instruments with reference to 4.1, 5 and 6.

TABLE 3. EFFECT OF NON-STANDARD INPUT ON 620 REV PER INDICATED KILOMETRE INSTRUMENT

1	2	3
Flexible drive input rev	Effect on odometer	Effect on speed indication
	%	%
621	0	0 to +5
625	+0.64	+0.64 to +5.64
630	+1.47	+1.47 to +6.47
635	+2.26	+2.26 to +7.26
640	+3.06	+3.06 to +8.06
645	+3.86	+3.86 to +8.86

TABLE 4. EFFECT OF NON-STANDARD INPUT ON 1000 REV PER INDICATED MILE INSTRUMENT

1	2	3
Flexible drive input rev	Effect on odometer	Effect on speed indication
	%	%
1000	0	0 to +5
1010	+1	+1 to +6
1020	+2	+2 to +7
1030	+3	+3 to +8
1040	+4	+4 to +9

NOTE. Tables 3 and 4 are for guidance. Scale mark spacing on a speedometer may be adjusted to compensate for different tyre revolutions per unit distance at various speeds. In general it can be stated that different tyres of similar composition and structure have similar speed/rolling radii characteristics. When applying a standard speedometer to a transmission having tyres of different construction or composition from that for which the instrument was originally specified, reference should be made to the speedometer manufacturer or the tyre manufacturer for an indication of the extent of the additional error due to the change in speed/rolling radii characteristics over the instrument effective range.

4.4 Re-settable trip odometers. The incorporation of a re-settable trip odometer shall be subject to agreement between the purchaser and the manufacturer, but if incorporated it shall comply with all the relevant requirements of this standard.

5. ACCURACY OF ODOMETER

The errors of odometers shall be within the limits of 0 to +4 % of the value for drive input specified in 4.1. For ratios other than the preferred, a spread of error of 5 % may be permitted, e.g. -1 % to +4 %.

6. ACCURACY OF SPEED INDICATION

The accuracy of speed indication shall comply with the requirements of Table 5. Calibration of the instrument to meet the specified accuracy should be carried out with the instrument in approximately the same angular position that it will have when mounted in the vehicle.

By agreement between the purchaser and the manufacturer closer deviations from true reading than those in Table 5 may be specified.

TABLE 5. ACCURACY OF SPEED INDICATION OF INSTRUMENT AS MANUFACTURED

1	2	3	4	5
Temperature range °C	Voltage range* V	Speed range		Maximum permissible deviation from true reading
		km/h	mile/h	
15 to 30	12 to 16 or 24 to 29	Over 48	Over 30	0 to 5 %
		16 to 48	10 to 30	0 to 2.5 km/h 0 to 1.5 mile/h
		Below 16	Below 10	Not specified

* Applicable only to heavy commercial vehicles.

7. CASES OR OTHER PROTECTION

7.1 The mechanism shall be contained in an enclosure tested in accordance with 17.2 to afford adequate protection. It shall not be damaged when subject to the vibration test specified in 17.3. Following the vibration test, a speedometer shall comply with the requirements of 6.