

Specification for

Railway turnouts for private users —

Part 1: Turnouts over which British
Railways locomotives operate —

Section 1.1: Turnouts using bull head
rails

Confirmed March 2010

Co-operating organizations

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

- Associated Offices' Technical Committee
- Association of Consulting Engineers*
- Association of Mining Electrical and Mechanical Engineers
- British Chemical Plant Manufacturers' Association
- British Compressed Air Society
- British Electrical and Allied Manufacturers' Association
- British Gear Manufacturers' Association
- British Internal Combustion Engine Manufacturers' Association
- British Steel Industry*
- British Mechanical Engineering Confederation
- Crown Agents for Oversea Governments and Administrations
- Department of Employment and Productivity
- Department of the Environment
- Department of Trade and Industry
- Department of Trade and Industry — National Engineering Laboratory
- Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales*
- Engineering Equipment Users' Association
- Gas Council
- Institution of Civil Engineers
- Institution of Gas Engineers
- Institution of Heating and Ventilating Engineers
- Institution of Mechanical Engineers
- Institution of Mechanical Engineers (Automobile Division)
- Institution of Production Engineers
- Locomotive and Allied Manufacturers' Association of Great Britain
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- Machine Tool Trades Association
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- Ministry of Defence, Army Department
- National Physical Laboratory (Department of Trade and Industry)
- National Coal Board*
- Royal Institute of British Architects
- Water-tube Boilermakers' Association

The 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 the British Standard:

- British Bolt, Nut, Screw and Rivet Federation
- Individual firms
- British Railways Board

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Foreword

This standard makes reference to the following British Standards:

BS 9, *Bull head railway rails.*

BS 24, *Railway rolling stock material.*

BS 24-3A, *Laminated springs and spring steel.*

BS 24-6, *Steel slabs, plates, sections, bars and rivets for locomotive boilers, locomotives, carriages and wagons.*

BS 47, *Steel fishplates for bull head and flat bottom railway rails.*

BS 64, *Steel fishbolts and nuts for railway rails.*

BS 84, *Parallel screw threads of Whitworth form.*

BS 729, *Zinc coatings on iron and steel articles.*

BS 729-1, *Hot-dip galvanized coatings.*

BS 913, *Pressure creosoting of timber.*

BS 970, *Wrought steels in the form of blooms, billets, bars and forgings.*

BS 970-1, *Carbon and carbon manganese steels, including free cutting steels¹⁾.*

BS 970-5, *Carbon and alloy spring steels for the manufacture of hot formed springs¹⁾.*

BS 1452, *Grey iron castings.*

BS 1802, *Steel spring washers for general engineering and automobile purposes.*

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee.

This standard relates exclusively to turnouts produced from new rails complying with BS 9. It is recognized that second quality and partly worn rails are used for the manufacture of turnouts, but it should be clearly understood that their use is subject to agreement between the purchaser and the supplier. The recommended minimum acceptance requirements for partly worn rails are given in Appendix A. Turnouts from curved track have been omitted from this standard as they would complicate the tables and diagrams, but when they are used, the minimum radius should be maintained, although the crossing angles obtained may be outside the range shown.

Special requirements such as insulation for track-circuiting have not been included.

Nomenclature is given in Table 1 with cross references to layout and component diagrams for identification of parts for standard turnouts.

Materials and dimensions are specified. The size of page adopted for this standard results in the detail in some of the figures being rather small for convenience of reading. Figure 15, Figure 16, Figure 17, Figure 18, Figure 19 may be obtained in a larger form by application to the British Standards Institution.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 26 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ In course of preparation.

1 Scope

This Section 1.1 of this British Standard specifies requirements for turnouts over which British Railways locomotives operate, from straight track 4 ft 8½ in gauge manufactured from new bull head rails to BS 9, section 95 R.

The angles of crossing are 1 in 7½, 1 in 8, 1 in 9, 1 in 10, 1 in 11 and 1 in 12.

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

2 Definitions

For the purposes of this Section of this British Standard the following definitions apply:

railway turnout

a complete unit consisting of curved track diverging from straight track as illustrated in the layout diagrams of this standard

hand of turnout

the direction in which the curved track leaves the straight track

3 Inspection

The purchaser or his representative shall have access at all reasonable times to those parts of the works engaged on the contract or order. He shall be at liberty to witness the manufacture at any stage.

4 Identification marking

Each complete turnout shall be marked by stamping with 1 inch letters and figures on the web of the wing rails at the check ends with the number of this British Standard i.e. 4521/1.1.

When rail components are supplied separately they shall be stamped on the end of the rail with the number of this British Standard and item number as shown in the nomenclature tables.

All chairs, baseplates and blocks shall be marked with identification letters, rail section, the manufacturer's initials and the month and year of manufacture.

5 Design and production

The design of turnouts is based on the British Railways standard for non-insulated track.

The minimum rail curvature shall be 518 ft. radius, measured to the running edge of the outer curved rail.

The switches shall be straight cut with joggled stock rails, operated by a spring-type lever box, unless remotely controlled.

The shaping of the rails shall be carried out by machining, sawing and pressing. The holes shall be drilled.

The turnouts shall be supported on timbers 12 inches by 6 inches in cross section.

Bolts shall be threaded BSF (BS 84) except where otherwise stated.

6 Nomenclature

The nomenclature and numerical reference numbers for components are given in Table 1, which refers to item numbers shown in Figure 1 to Figure 23.

Component details are given in Figure 6 to Figure 23 as a further aid to identification.

7 Materials

Materials shall be in accordance with the requirements shown in Table 2.

8 Dimensions

The leading dimensions shall be in accordance with Figure 1, Figure 2, Figure 3 and Figure 5, and Table 3 and Table 4.

The rail shall comply with the requirements specified in BS 9, section 95 R.

The fishplates shall comply with the requirements specified in BS 47 and the fishbolts and nuts shall comply with the requirements specified in BS 64 except that the length of the bolts shall be 4¾ inches instead of 4⅝ inches.

Appendix A Partly worn rail

Partly worn bull head rail used for the construction of turnouts should have a minimum depth, measured on the vertical axis, of $5\frac{7}{16}$ in. or a minimum weight of 88 lb/yd.

It should be free from excessive side wear, chair gall and corrosion.

As a guide to the purchaser, it is recommended that bull head rail should be renewed when the depth reaches $5\frac{1}{8}$ in. The precise figure will be dependent on the following conditions:

Condition of sleepers and timbers.

Spacing of sleepers and timbers.

Condition of ballast.

Presence of side cutting.

Table 1 — Nomenclature for components

Item No.	Description	Figure Nos.	Item No.	Description	Figure Nos.
1	Stock rail, left hand and right hand	Figure 1, Figure 4, Figure 10 and Figure 11	21	Switch slide chair	Figure 1, Figure 4 and Figure 12
2	Switch tongue rail, left hand and right hand	Figure 1, Figure 4, Figure 10 and Figure 11	22	Switch block chair	Figure 1, Figure 4 and Figure 12
3	Straight running rail	Figure 1 and Figure 4	23	Short base common chair L1	Figure 1, Figure 4 and Figure 9
4	Straight closure rail	Figure 1 and Figure 4	24	End check chairs, left and right hand	Figure 1, Figure 4 and Figure 21
5	Curved running rail	Figure 1 and Figure 4	25	Check chair	Figure 1, Figure 4 and Figure 21
6	Curved closure rail	Figure 1 and Figure 4	26	Crossing chairs	Figure 1, Figure 4, Figure 21 and Figure 22
7	Rail joint, fishplated	Figure 1 and Figure 6	27	Crossing nose chair	Figure 1, Figure 4 and Figure 20
8	Wing rail, right hand	Figure 1, Figure 4, Figure 15, Figure 16, Figure 17, Figure 18 and Figure 19	30	Crossing blocks	Figure 1, Figure 4, Figure 15, Figure 16, Figure 17, Figure 18, Figure 19 and Figure 20
9	Wing rail, left hand	Figure 1, Figure 4, Figure 15, Figure 16, Figure 17, Figure 18 and Figure 19	32	First stretcher bar	Figure 1, Figure 4, Figure 10, Figure 11 and Figure 14
10	Check rail	Figure 1, Figure 4, Figure 16, Figure 18 and Figure 19	33	Second stretcher bar	Figure 1, Figure 4, Figure 10, Figure 11 and Figure 14
11	Point rail	Figure 1, Figure 4, Figure 15, Figure 16, Figure 17, Figure 18 and Figure 19	34	Connecting rod (adjustable)	Figure 1, Figure 10 and Figure 11
12	Splice rail	Figure 1, Figure 4, Figure 15, Figure 16, Figure 17, Figure 18 and Figure 19	35	Distance blocks (switches)	Figure 1, Figure 4, Figure 10, Figure 11 and Figure 13
20	Common chair S1	Figure 1, Figure 4 and Figure 8	37	Timbers	Figure 1 and Figure 4

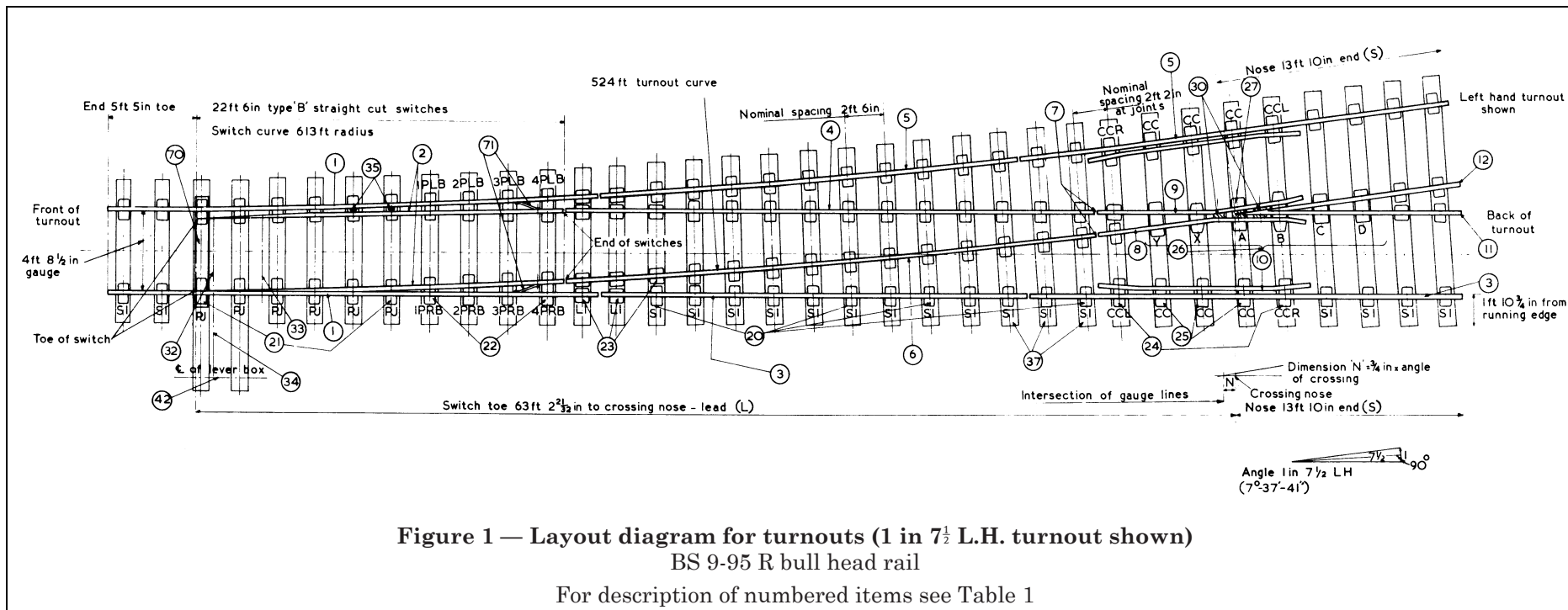
Table 1 — Nomenclature for components

Item No.	Description	Figure Nos.	Item No.	Description	Figure Nos.
38	Coach screw or fang bolt	Figure 7	47	Crossing, 1 in 10	Figure 17
39	Ferrule	Figure 7	48	Type C straight cut switches	Figure 11
40	Key	Figure 7	49	Crossing, 1 to 11	Figure 18
41	Switch and crossing bolts, nuts and spring washers	Figure 10, Figure 11, Figure 13, Figure 15, Figure 16, Figure 17, Figure 18, Figure 19 and Figure 23	50	Crossing, 1 in 12	Figure 19
42	Lever box (spring operated)	Figure 1, Figure 10 and Figure 11	70	Soleplate	Figure 1, Figure 4, Figure 10, Figure 11 and Figure 14
43	Type B straight cut switches	Figure 10	71	Switch anchor	Figure 1, Figure 4, Figure 10, Figure 11 and Figure 13
44	Crossing, 1 in 7½	Figure 15	72	Cast iron washers	Figure 1, Figure 3 and Figure 16
45	Crossing, 1 in 8	Figure 16	73	Spring washers	Figure 13, Figure 14, Figure 15 and Figure 23
46	Crossing, 1 in 9	Figure 17			

Table 2 — Materials for components

Part	Material	BS reference ^a	Part	Material	BS Reference
Bull head rail	Steel	BS 9	Fang bolts and shoes	Steel	BS 64, (quality only)
Stretcher bars	Steel	BS 24-3A:Grade 8	Switch and crossing blocks and washers	Cast iron	BS 1452:Grade 12
Stretcher bar brackets	Steel	BS 24-6:Grade 621	Fishplates	Steel	BS 47:Class B
Connecting rod (adjustable)	Steel	BS 24-6:Grade 621	Fishbolts and nuts	Steel	BS 64
Soleplate	Steel	BS 24-6:Grade 621	Switch and crossing bolts and nuts	Steel	BS 64, (quality only)
Chairs	Cast iron	BS 1452:Grade 12	Spring washers	Steel	BS 1802
Keys	Hardwood or steel		Switch anchors	Steel	BS 24-6:Grade 621
Coach screws	Steel	BS 970-1. Steel 080M40, galvanized to BS 729-1	Timbers	Douglas fir or similar quality, incised and pressure creosoted where possible	BS 913
Ferrules	Hardwood or approved plastics material				

^a See page ii for titles of these standards.



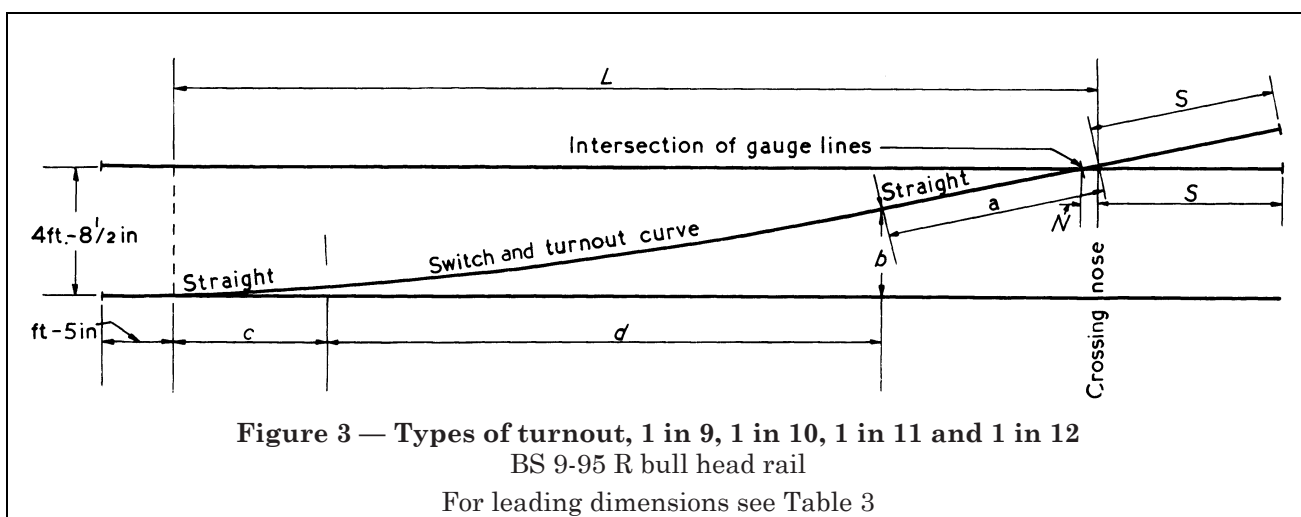
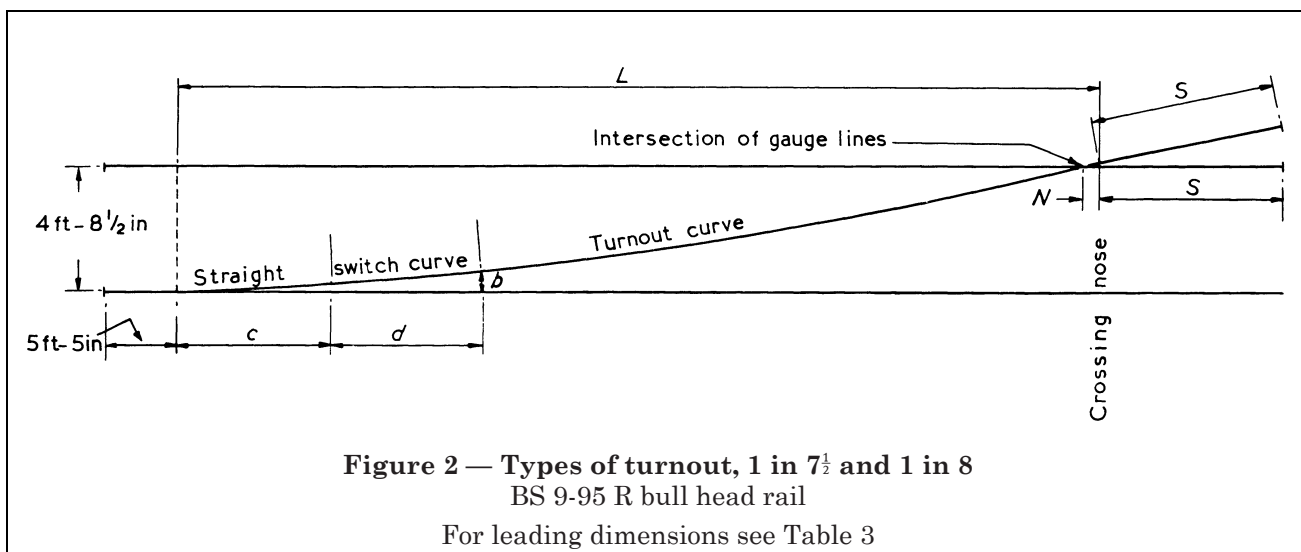


Table 3 — Leading dimensions of turnouts in Figure 1, Figure 2 and Figure 3

Type of switch	Switch curve radius	Length of switch rail	Angle of crossing	Switch toe to crossing nose <i>L</i>	Turnout radius	DIMENSIONS				Crossing nose to end of vee <i>s</i>	Crossing nose to intersection point <i>N</i>	Type of turnout
						<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>			
<i>B</i>	ft	ft – in	1 in $7\frac{1}{2}$	ft – in $63 - 2\frac{21}{32}$	ft 524	ft – in NIL	ft – in $10\frac{11}{16}$	ft – in 7 – 4	ft – in 15 – 2	ft – in 13 – 10	in $5\frac{5}{8}$	Figure No.
			1 in 8	$65 - 1\frac{3}{8}$							6	Figure 2
			1 in 9	$65 - 8\frac{11}{32}$	613	$9 - 1\frac{1}{4}$	$3 - 8\frac{25}{64}$		$48 - 9\frac{1}{32}$		$6\frac{3}{4}$	Figure 3
			1 in 10	$67 - 1\frac{25}{32}$		$17 - 3\frac{3}{32}$	$2 - 11\frac{53}{64}$		$42 - 0\frac{1}{32}$		$7\frac{1}{2}$	
<i>C</i>	960	28 – 6	1 in 11	$81 - 11\frac{1}{2}$	960	$9 - 0\frac{17}{32}$	$3 - 10\frac{21}{32}$	9 – 2	$63 - 1\frac{3}{16}$	16 – 4	$8\frac{1}{4}$	
			1 in 12	$83 - 2\frac{11}{32}$		$17 - 5\frac{9}{16}$	$3 - 3\frac{3}{16}$		$55 - 10\frac{15}{32}$		9	