

Specification for

Railway turnouts for private users —

**Part 4: Heavy grade turnouts over
which British Railways locomotives do
not operate, for axle loads which may
exceed 25 tons, using flat bottom rails**

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Foreword

This British Standard has been prepared under the authority of the Mechanical Engineering Industry Standards Committee. It is one of a series of specifications of which the full list is as follows:

BS 4521, *Railway turnouts for private users.*

- *Part 1: Turnouts over which British Railways locomotives operate;*
- *Section 1.1: Turnouts using bull head rails;*
- *Section 1.2: Turnouts using flat bottom rails;*
- *Part 2: Light grade turnouts over which British Railways locomotives do not operate, for axle loads not exceeding 10 tons, using flat bottom rails;*
- *Part 3: Medium grade turnouts over which British Railways locomotives do not operate, for axle loads not exceeding 25 tons;*
- *Section 3.1: Turnouts using bull head rails;*
- *Section 3.2: Turnouts using flat bottom rails;*
- *Part 4: Heavy grade turnouts, over which British Railways locomotives do not operate for axle loads which may exceed 25 tons, using flat bottom rails.*

This Part of this standard relates exclusively to turnouts constructed from new rails with fabricated rail or cast manganese crossings.

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.

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 to iv, pages 1 to 42, an inside back cover 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 Scope

This Part 4 of this British Standard specifies requirements for heavy grade turnouts over which British Railways locomotives do not operate, for axle loads which may exceed 25 tons, from straight track 4 ft 8½ in gauge constructed from new flat bottom rail dimensionally in accordance with BS 11, Section 110A or 113A, in wear resistant rail steel quality of minimum tensile strength and typical chemical composition shown in the following table.

Axle load (tons)	Over 25 and up to 35	Over 35
Minimum tensile strength (tons/in ²)	57	63.5
Minimum tensile strength (kg/mm ²)	90	100.0
Typical chemical composition	%	%
Carbon	0.45 to 0.65	0.68 to 0.78
Manganese	1.70 to 2.10	1.10 to 1.40
Silicon	0.40 (max.)	0.20 to 0.50
Chromium	—	1.00 to 1.30
Sulphur (max.)	0.03	0.04
Phosphorus (max.)	0.03	0.05

The crossing shall be constructed from rails of material composition in accordance with the above table or alternatively be of cast austenitic manganese steel complying with the requirements of BS 1457, as specified by the purchaser.

The angles of crossing are 1 in 4½, 1 in 5, 1 in 5½, 1 in 6, 1 in 6½, 1 in 7, 1 in 7½ and 1 in 8.

NOTE The titles of the British Standards referred to in this standard are listed on the inside back cover.

2 Definitions

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

2.1

railway turnout

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

2.2

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 in high letters and figures on the web of the wing rails at the check ends with the number of this British Standard followed by a stroke and a number indicating the Part of the standard, i.e. BS 4521-4.

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 table.

All castings shall be marked with identification letters and rail section and, where possible, the manufacturer's initials and the month and year of manufacture.

Baseplates and rolled steel supports shall be marked with identification numbers.

5 General requirements

The design of heavy grade turnouts is based on the centre line radius. The minimum radius shall be 190 ft 8¼ in measured to the centre line of the track.

The switches shall be straight cut with jogged stock rails and operated by a spring type lever box. They shall be either heel or spring type as specified by the purchaser.

The shaping of the rails shall be carried out by machining, sawing and pressing. The holes shall be drilled. Bolts shall be threaded BSF (complying with BS 84) free class, with nut threads normal class, except where otherwise stated.

Alternative rail fastenings to those specified in this part of this standard may be used subject to agreement between the purchaser and the supplier.

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 10 and Figure 17 to Figure 30.

Component details are given in Figure 17 to Figure 30 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 3, Figure 11 and Figure 14 for heel switch turnouts and Figure 2, Figure 4, Figure 12, Figure 13 and Figure 15 for spring switch turnouts and with the tables associated with these figures.

The rail section shall comply dimensionally with the requirements of BS 11, Section 110A or Section 113A.

The fishplates shall comply with the requirements of BS 47 and the fishbolts and nuts shall comply with BS 64.

NOTE All the figures are based on BS 11, Section 110A rail. If the purchaser specifies Section 113A rail, the figures are valid except that the blocks of Figure 29 will have to be modified.

Table 1 — Nomenclature for components

Item No.	Description	Figure no.	
		Heel switch turnouts	Spring switch turnouts
601	Stock rail L.H. for L.H. turnout	1, 3, 5	2, 4, 6
602	Stock rail R.H. for L.H. turnout	1, 3, 5	2, 4, 6
603	Stock rail L.H. for R.H. turnout	1, 3, 5	2, 4, 6
604	Stock rail R.H. for R.H. turnout	1, 3, 5	2, 4, 6
605	Switch tongue rail L.H. for L.H. turnout	1, 3, 5	2, 4, 6
606	Switch tongue rail R.H. for L.H. turnout	1, 3, 5	2, 4, 6
607	Switch tongue rail L.H. for R.H. turnout	1, 3, 5	2, 4, 6
608	Switch tongue rail R.H. for R.H. turnout	1, 3, 5	2, 4, 6
609	Straight running rail	1, 3, 7, 8	2, 4, 7, 8
610	Straight closure rail	1, 3, 5, 8	2, 4, 6, 8
611	Curved running rail	1, 3, 7	2, 4, 7
612	Curved closure rail	1, 3, 5, 8	2, 4, 6, 8
613	Wing rail R.H.	1, 7	2, 7
614	Wing rail L.H.	1, 7	2, 7
615	Check rail	1, 3, 7, 8, 19	2, 4, 7, 8 19, 20
616	Point rail	1, 7	2, 7
617	Splice rail	1, 7	2, 7
664	Switch single bracket baseplate	1, 3, 5, 27	2, 4, 6, 27
665	Switch double bracket baseplate	—	2, 4, 6, 27
530	Switch heel block	1, 3, 5, 29	—
631	Back heel block	1, 3, 5, 29	—
632	Switch distance blocks	—	2, 4, 6, 29
633	Crossing blocks	1, 3, 7, 8, 29	2, 4, 7, 8, 29
534	Check blocks	1, 3, 7, 8, 29	2, 4, 7, 8, 29
535	End check blocks	1, 3, 7, 8, 29	2, 4, 7, 8, 29
107	Joint (fishplated)	1, 3, 8, 22	2, 4, 8, 22
116	Fishplates	22	22
182	Fishbolt, nut and washer	22	22
132	First stretcher bar	1, 3, 5, 28	2, 4, 6, 28
133	Second stretcher bar	1, 3, 5, 28	2, 4, 6, 28
34	Connecting rod	1, 3, 5	2, 4, 6
42	Lever box (spring operated)	1, 3, 5	2, 4, 6
545	Rolled steel supports	1, 3, 5, 7 8, 9, 24	2, 4, 6, 7 8, 10, 24
546	Spring clip for rolled steel supports	5, 7, 8, 26	6, 7, 8, 26
563	Steel sleeper	1, 3, 5, 9, 25	2, 4, 6, 10, 25
647	Switch and crossing bolts	5, 30	30
73	Spring washers	30	30
621	Lock nut	30	30
650	9 ft heel switches	16	—
651	Rail crossing, 1 in 4½ for heel switch turnout	19	—
652	Rail crossing, 1 in 5 for heel switch turnout	19	—
653	Rail crossing, 1 in 5½ for heel and spring switch turnouts	19	19
654	12 ft heel switches	17	—
655	Rail crossing, 1 in 6 for heel and spring switch turnouts	19	19
656	Rail crossing, 1 in 6½ for heel and spring switch turnouts	19	19
657	Rail crossing, 1 in 7 for heel and spring switch turnouts	19	19
658	Rail crossing, 1 in 7½ for heel and spring switch turnouts	19	19
659	Rail crossing, 1 in 8 for heel and spring switch turnouts	19	19
660	Spring switches	—	18
661	Rail crossing, 1 in 4½ for spring switch turnout	—	20

Table 1 — Nomenclature for components

Item No.	Description	Figure no.	
		Heel switch turnouts	Spring switch turnouts
662	Rail crossing, 1 in 5 for spring switch turnout	—	20
666	Manganese crossing, 1 in 4½	8, 21	8, 21
667	Manganese crossing, 1 in 5	8, 21	8, 21
668	Manganese crossing, 1 in 5½	8, 21	8, 21
669	Manganese crossing, 1 in 6	3, 8, 21	4, 8, 21
670	Manganese crossing, 1 in 6½	8, 21	8, 21
671	Manganese crossing, 1 in 7	8, 21	8, 21
672	Manganese crossing, 1 in 7½	8, 21	8, 21
673	Manganese crossing, 1 in 8	8, 21	8, 21
674	Vee joint block for manganese crossing	3, 8, 21	4, 8, 21
675	Vee fishbolts for manganese crossing	8, 21	8, 21
676	Cast iron washers	30	30
677	Cast iron ferrule	30	30
678	Special fishplate for manganese crossing, 1 in 7½ and 1 in 8	23	23

Table 2 — Materials for components

Part	Material
Rails	BS 4521-4
Stretcher bars	BS 24-3A, Grade 8
Stretcher bar brackets	BS 24-6, Grade 621
Connecting rod (adjustable)	BS 24-6, Grade 621
Baseplate	BS 24-6, Grade 621
Rolled steel supports	BS 500
Spring clip (rolled steel support)	BS 970-5, steel 250A53
Fishbolts and nuts	BS 64
Switch, crossing and check bolts and nuts	BS 64
Spring washers	BS 1802
Fishplates	BS 47, Class B
Crossing switch and check blocks and cast iron washers	BS 1452, Grade 12
Steel sleeper	BS 500
Cast manganese crossing	BS 1457

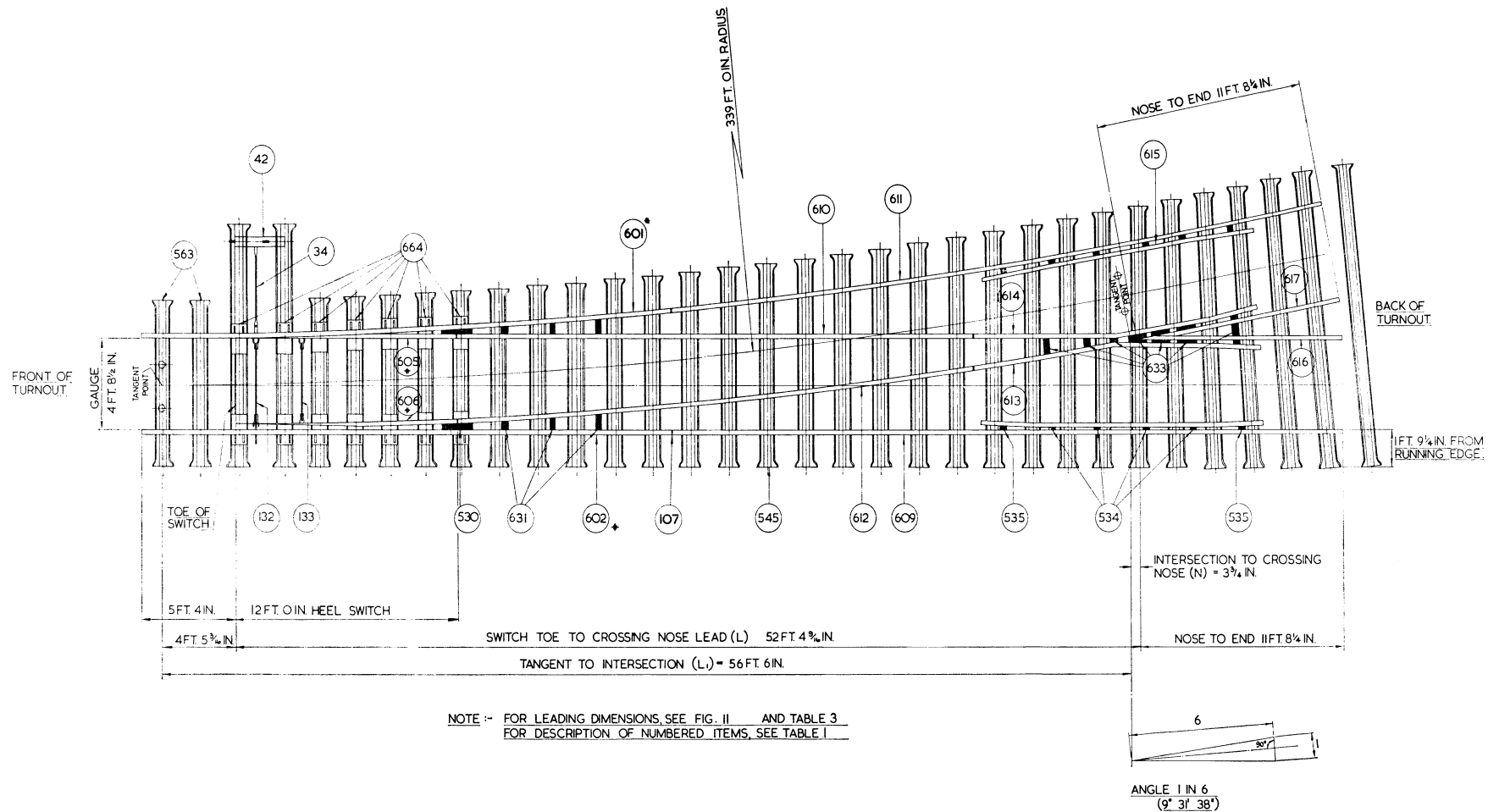


Figure 1 — Layout diagram for heel switch turnouts with rail crossings

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, items no. 601 to read 603
602 to read 604
605 to read 607
606 to read 608

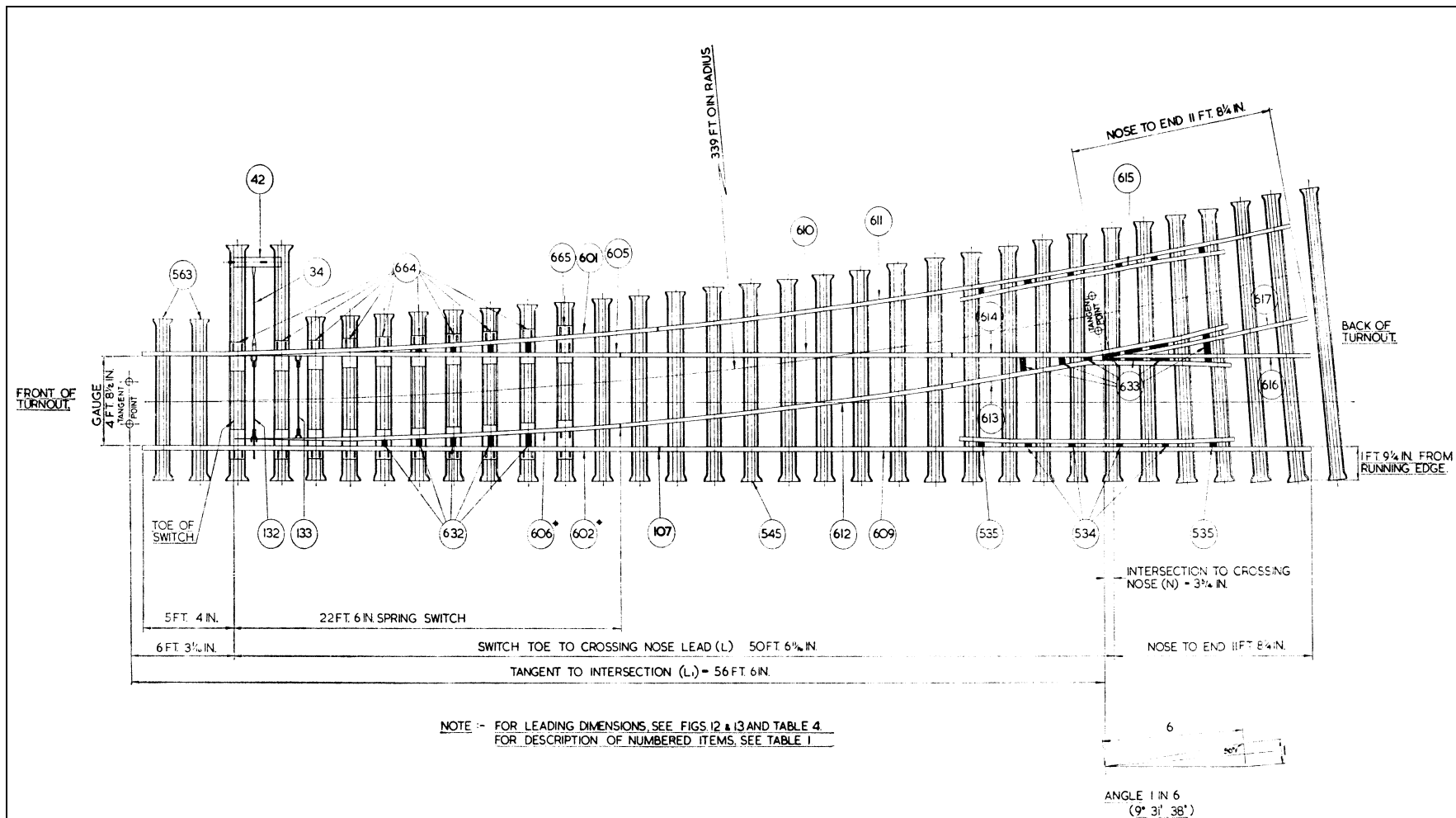


Figure 2 — Layout diagram for spring switch turnouts with rail crossings

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, items no. 601 to read 603
602 to read 604
605 to read 607
606 to read 608

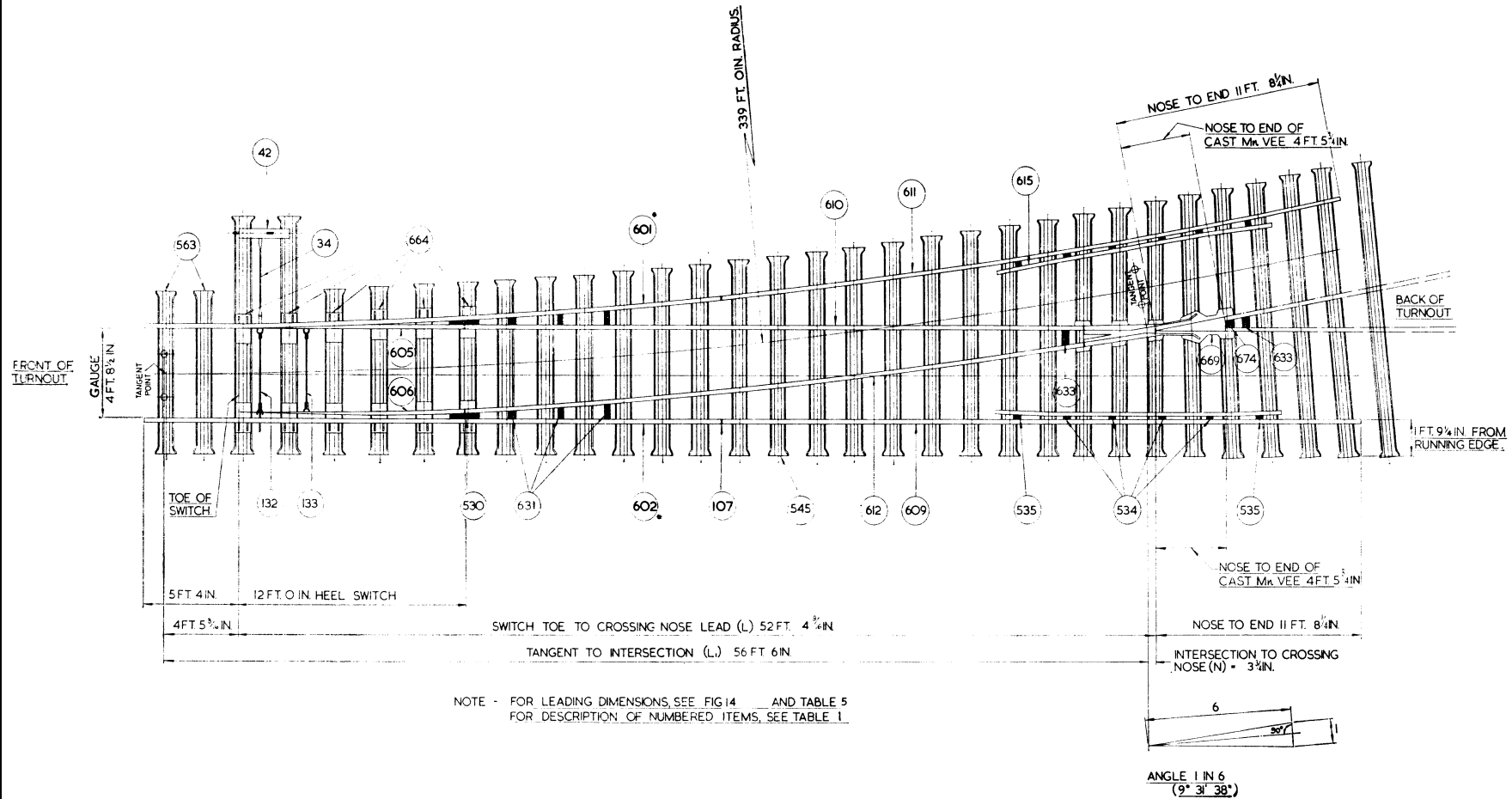


Figure 3 — Layout diagram for heel switch turnouts with cast manganese crossings

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, items no. 601 to read 603
602 to read 604
605 to read 607
606 to read 608

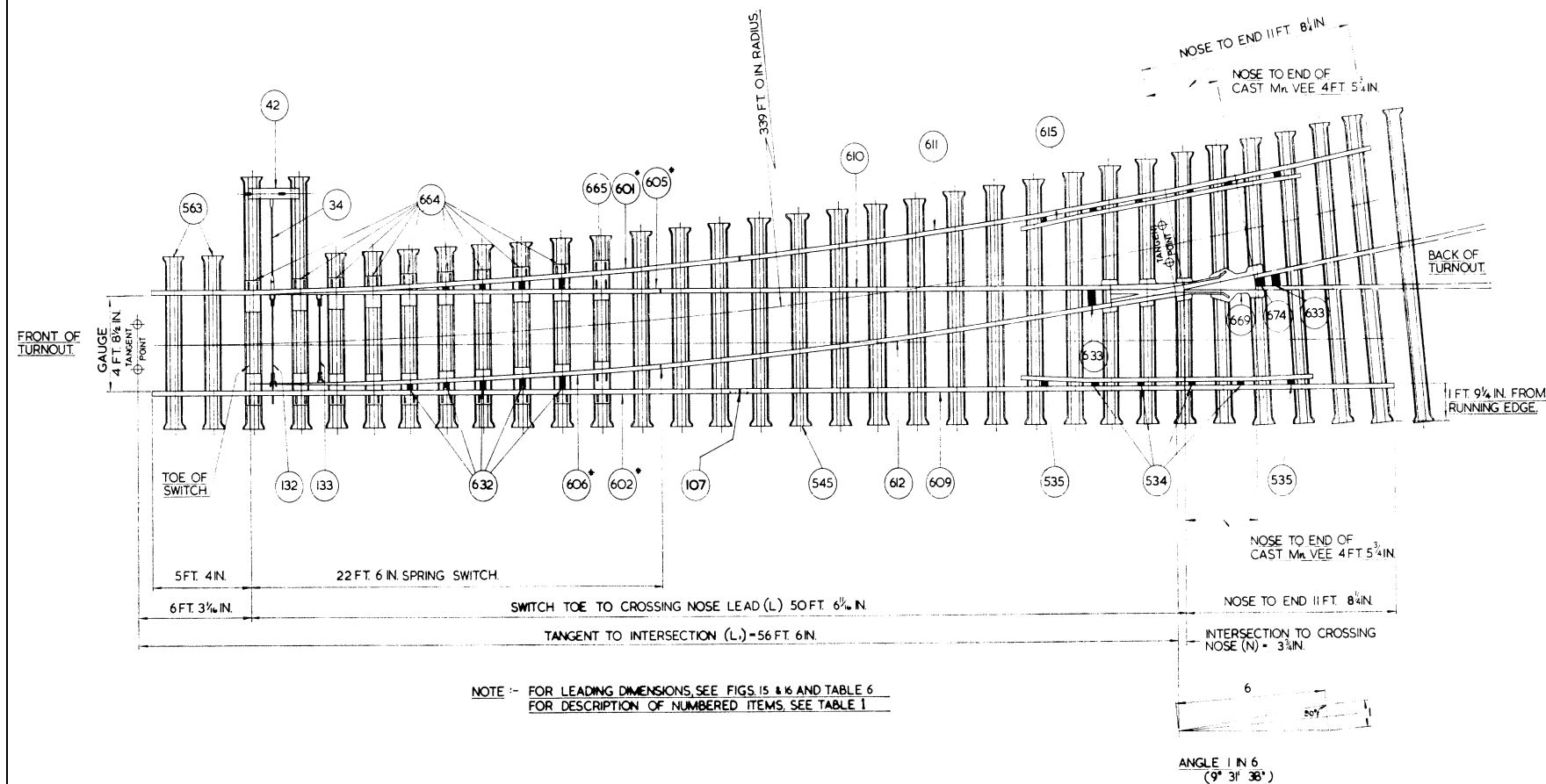
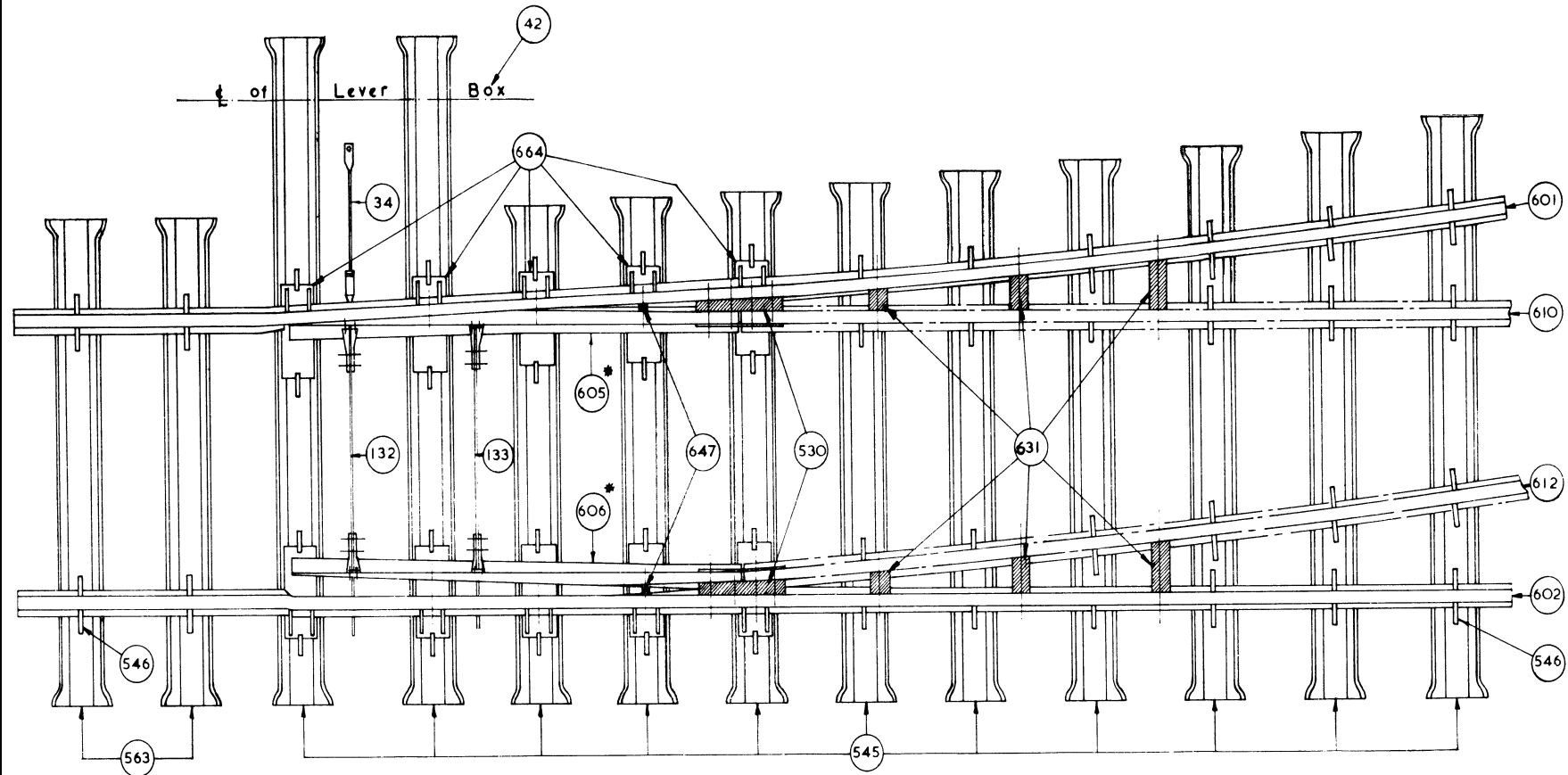


Figure 4 — Layout diagram for spring switch turnouts with cast manganese crossings

BS 11 Section 110A flat bottom rail
(1 in 6 left-hand turnout shown)

* For right-hand turnouts, items no. 601 to read 603
602 to read 604
605 to read 607
606 to read 608



NOTE For description of numbered items see Table 1.

Figure 5 — Heel switches nomenclature

BS 11 Section 110A flat bottom rail
(left-hand switches shown)

* For right-hand turnouts, items no. 601 to read 603
602 to read 604
605 to read 607
606 to read 608