# TRACK MAINTENANCE
# PART-II
# CHAPTER 1
# POINTS & CROSSINGS

## 1.1 NEED FOR POINTS & CROSSING

For transfer of railway vehicles from one track to other, a special assembly viz (Pts. & Xing) is required. Points and crossings are necessary when the trains are diverted from one track to other where special arrangements are made for the movement of wheels. The point facilities the vehicle to divert and crossing provides the gap in the rail to be crossed by flange wheels. The points & crossing can be provided on parallel or diverging or converging track. The points & crossing are also called turnouts. A turn-out is designed as right hand and left hand turnout depending upon whether the traffic is diverted to right or left.

**1.2 SWITCHES :--**To facilitate the transfer of trains

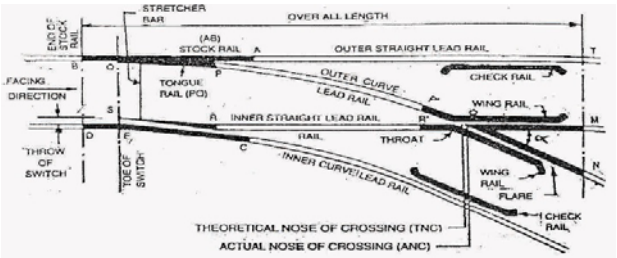

FIG. 1.1 RIGHT HAND TURNOUT

from one track to another switch and crossing assemblies are provided. All switch and crossing however complicated, is built up from three basic units joined together with necessary plain rails called closure or lead rails. These units are:

(a) Switches

(b) Acute or Vee crossing

(c) Obtuse angle crossing.

In Fig 1.1 Track B takes off from track A and the arrangement is called a Turn- out. This consists of a switch assembly and a Vee crossing assembly joined with a few closure rails.

## 1.3 SWITCH ASSEMBLY (FIG. 1.2)

A set of switch consists of four rails, the outer two are known as stock rails and the inner two as switch or tongue rails. A stock rail and a tongue rail match together to from a switch. A pair of tongue rails with their stock rail are commonly known as points. The switch rail are firmly held by stretcher bars and can be set to give a passage for traffic to either one track or the other. The switch rails pivot about a point known as the heel.

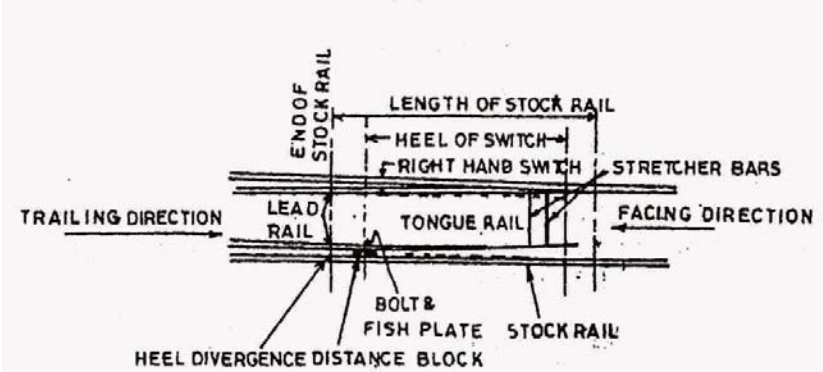

FIG. 1.2 SWITCH ASSEMBLY

The switch rail is machined out of plain rail sections. In some modern design switch rails are formed out of special thick web rail sections. These have been provided in the new design of high speed passenger turnouts.

For switches, a number of design exist, but broadly they fall into the following two categories.

**1.3. 1Fixed Heel or Spring Switches (Fig .1.3)**

In this design, the tongue or switch rails are rigidly connected to stock rails at the heel by means of distance blocks, bolts and nuts. Movement of the switches is effected by springing from the first block.

Fixed heel switches are of two designs (a) straight switches and (b) curved switches.

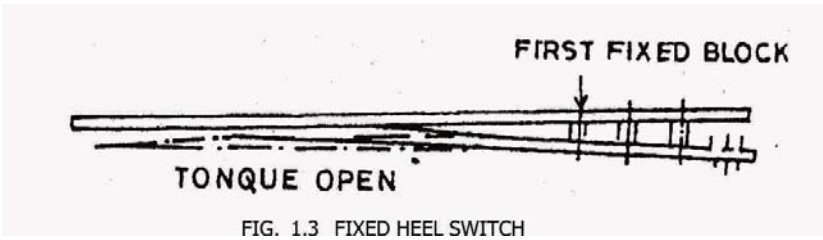

FIG. 1.3 FIXED HEEL SWITCH

**Straight Switches :** In this type, the tongue rail is straight from the tip of the switch to the heel.

**Curved Switches:** In this type the switch rail is straight from the tip of the heel to the same radius as that of the turnout.

In both the cases of straight and curved switches,(interchangeability not possible) the tongue rail for left and right hand turn outs are interchangeable. In the case of curved switches, the switch rails are left straight by the manufacture and are spring to the appropriate radius when lying in track.

A few designs of partly curved switches have also been developed by RDSO for the MG system.

**1.3.2 Loose Heel Switches (Fig .1.4)**

The switch rail pivot about heel joints held by blocks and fishplates. The fishplate holding the switch rails given an appropriate bend to permit free movement of switch rail. In view of comparatively sharper change of curvature, and consequent knocking caused to the rolling stock, loose heel switches are not favoured in new layouts.

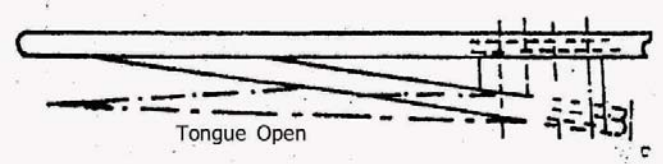


FIG. 1.4 LOOSE HEEL SWITCHES

**Design of Switch**

They are generally of the following two types :

1. The ordinary or undercut switches in which the foot of the stock rail is planned to accommodate the tongue rail. (fig 1.5)
2. Over riding switch in which the foot of the tongue rail is so planned that it over rides the foot of the stock rail, which is maintained to full section in the over riding switch the head of the tongue rail for part of its length is kept higher than that of the stock rail by 6mm which reduces the amount of undercut in the foot of the tongue rail. This difference in height is adjusted by putting special machined bearing plates behind the heel. The main fault with over riding switches is their relatively thin blade tip which is liable to damage owing to lateral forces imposed by the moving wheel. Over riding type of switches (Fig. 1.6). have been standardized in the Indian Railways. Advantages with the adoption of over riding type of switches are as follows:

(a) The stock rail being uncut is not be a source of weakness.

(b) As all the planning is confined to the tongue rail, its cost is less than planning both tongue and stock rails.

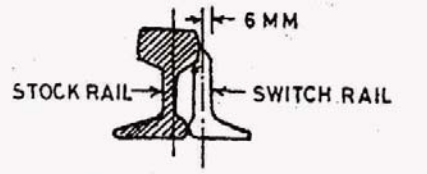


*FIG. 1.5 UNDERCUT SWITCH*

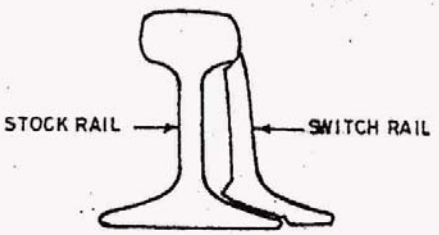


FIG. 1.6 OVER RIDING SWITCH

(c) Although the tongue rail in the over riding switch may appear to be weaker than in the ordinary switch, it is supported by the stock rail for the whole of the weakened portion of its length and the combined strength of the two rails between sleeper is greater than that of the tongue in the undercut switch. (Fig.1.5)

**1.3.3 Description of common terms used in switch Assmbly**

1. **Tongue rail :** Tongue rail is a tapered movable rail, which is attached at or near its thicker end to a running rail.
2. **Stock rail :** Stock rail is a running rail to which a tongue rail is attached.
3. **Switch :** A pair of tongue rails, with necessary connection forms a switch (without stock rails).
4. **Points :** A pair of tongue rails and stock rails with necessary connections forms points.

5. **Lead rails :** Plain rails laid in a turnout between the switches and crossing assemblies are called lead rails.
6. **Heel of switch :** It is an imaginary point on the gauge line mid way between the end of lead rail and the tongue rail in case of loose heel switches. It is a point on the gauge line of tongue rail opposite to the centre of the heel block in case of fixed heel switches. Heel block is the first block from the toe side fixing the tongue rail to the stock rail.
7. **Toe of switch :** The thin tapering end of the tongue rail is called the toe.
8. **Theoretical toe of switch :** It is the point of intersection of gauge lines of tongue rail at it's toe when extended, and the stock rail.
9. **Switch length :** It is the free length of tongue rail from the toe to the heel of a switch.
10. **Loose heel :** When the lead rails form a joint with the tongue rail at the heel of a switch, it is called a loose heel switch.
11. **Fixed heel :** When the tongue rail does not form a joint with the lead rail at the heel of a switch it is called a fixed heel switch.
12. **Switch angle :** Switch angle is the angle between the gauge lines of the tongue rail at its toe and the stock rail, when the switch is in the closed position. In the case of curved switch, gauge line at the toe of the switch is the tangent to the tongue rail at its toe.
13. **Throw of switch:** (Fig.1.7) It is the distance through which a tongue rail moves at its toe from its closed to open position.

The throw of any switch is fixed from the consideration of maximum flange way clearance obtained between the tongue and the stock rail at the point where tongue rail attains the full head width and is closest to the stock rail in the open position, i.e. point 'p' in fig. below. Throw has been fixed at 115mm for BG and 100 mm for MG.( for thickweb switches - it will be 160 mm) to get a minimum flange way clearance of 44mm and 41 mm respectively at point 'P'.

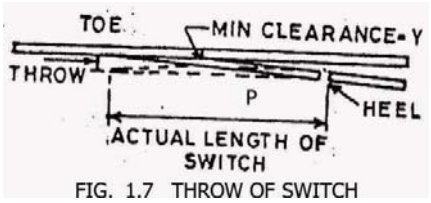

FIG. 1.7 THROW OF SWITCH

14. **Heel divergence :** Heel divergence is the shortest distance from gauge line of stock rail to gauge line of tongue rail, at the heel of switch i.e. it is the clear distance between the tongue rail and the stock rail at the heel plus rail head width. This is also fixed with the consideration of getting the minimum flange way clearance.
15. **Left or right hand stock rails :** Tongue rails stock rails and other fittings are called left hand or right hand according to their position looking in the facing direction of points.
16. **Stretcher bars :** Made of spring steel flats, they are rigidly fixed to the tongue rails by brackets and help to maintain the tongue rails at correct distance apart.
17. **Gauge tie plates :** Gauge tie plates of 12mm thickness for BG and 10 mm thickness on MG made out of steel flats are provided over the wooden/prc sleepers directly under the toe of the switches, and over wooden sleepers under the nose of crossing to ensure exact gauge at these important locations.

## 1.4. CROSSING ASSEMBLY

### 1.4.1. Crossing

A Device introduced at the location where two gauge faces have to cross each other to permit wheels flanges of the rolling stock moving from one track to the other track with maximum safety and minimum disturbances.

### 1.4.2 Type of crossings

Crossings are generally of two types :

(a) Common, acute angled or vee crossing in which the intersection of two gauge lines form an acute angle (below $90_0$), see Fig. 1.8

(b) Obtuse crossings, in which the intersection of two gauge lines form an obtuse angle (above $90_0$) see 1.9 below :

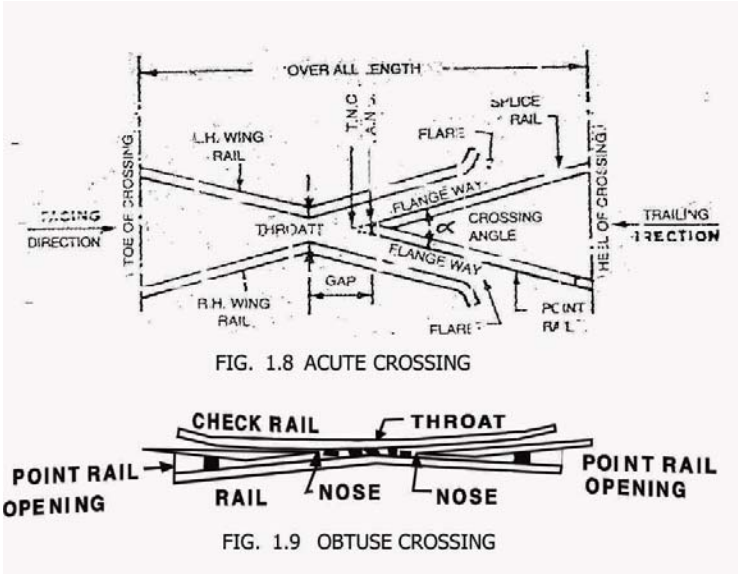


FIG. 1.8 ACUTE CROSSING




FIG. 1.9 OBTUSE CROSSING

### 1.4.3 Number of a Crossing (Fig. 1.10)

The number of a crossing is defined as the ratio of the spread at the leg of the crossing to the length of crossing measured from its theoretical nose. In the Indian Railways, this number is taken as the cotangent of the angle formed by the crossing.

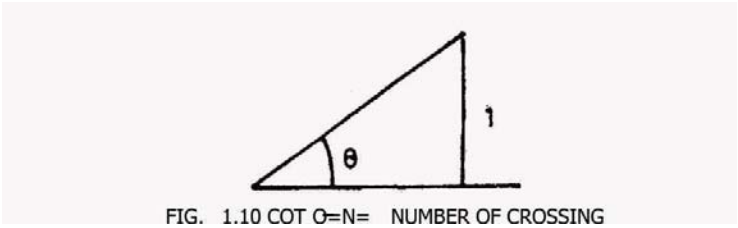

FIG. 1.10 COT O=N= NUMBER OF CROSSING

The smooth passage of the rolling stock from one track to another depends among other factors on the angle of the crossing, which is kept as small as possible for high speed traffic on the running lines. In the Indian Railways, four angels of crossing namely in 1 in 8½, 1 in 12, 1 in 16 and 1 in 20 are generally used.

### 1.4.4. Classification of Crossing According to Manufacturing Process

**Built up crossings (Fig. 1.11)**

Crossings consist of point and splice rails, wing rails, and check rails suitably held together. The assembly is made out of rails normally used for track. The point and splice rails form the vee of the crossing and to avoid the junction of these components at the nose, which would obviously be a weakness, the splice rail is housed in a notch in the point rail. The point and the splice rails are held together by turned bolts where the point and splice rails diverge they are held in their relative position with the distance blocks and bolts. Wing rails which are provided on either side of the vee and rigidly held to the vee at the requisite distance, with distance blocks and bolts, which is 44 mm for BG and 41 mm for MG. Early damage to the nose of the crossing is prevented by planning up to 6 mm from the top of the rail at the nose and running out the cut in about 90 mm along the vee. The lowering of nose compels wing rail to support the wheels as the pass over the narrow section at the nose. Wings have flared ends. Check rails which are made from ordinary rail pieces are held to the running rail with distance blocks and bolts.

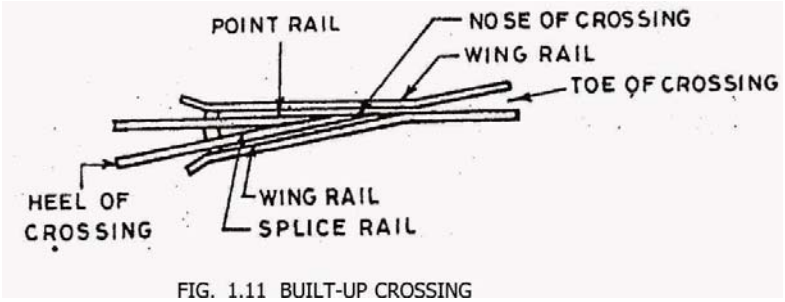

FIG. 1.11 BUILT-UP CROSSING

Weldable Crossing: Welded crossings are now introduced on IR recently.. These crossings are built up by welding suitably machined rail pieces and in some cases enclosing a piece of high strength wear resistant steel bar between the running rails. The latter type, manufacture according to the patented process of M/s. Henry Boot of U.K., is planned for trial on Indian Railways. These crossings with less of loose parts and made out of tougher steel, are expected to give much longer service life in track.

**Cast Manganese Steel Crossing (CMS Crossing)**

Built up or fabricated crossing has a large number of separate units to which attention must be paid during service. The vee formed by the point and splice rails is weakened by heavy machining of the head and foot. To afford better resistance to wear and reduce the cost of maintenance and frequent renewals,

cast manganese steel solid crossings have been evolved. Other advantages of cast manganese steel solid crossings when compared to common fabricated crossings are as follows:

1. Fabricated crossings demand higher maintenance labour to keep the bolts and fastenings tight.
2. When the looseness develops in them, high rail stresses are set up.
3. They lack vertical stiffness.
4. The change of section points in the assembly of rails are stress raising features, which are compatible with the best engineering practice.
5. CMS crossings are particularly useful in continuous welding of rails through points and crossing as they do not need any special strengthening so necessary for fabricated crossings.

Technologies have been developed for butt welding of CMS crossing with the plain line rails by interposing a compatible transition piece of alloy steel. This technology patented by M/s. Voest Alpine of Austria, is being obtained for Indian Railways for use on high speed heavy density routes. CMS crossings are costlier but they [more than] repay for their initial investment in their longer life.

**1.5. Check rails (Fig. 1.12)**

Check rails are positioned opposite all common crossings to constrain the wheel flange passing between the check rail and its running rail in such a way that the flange of the opposite wheels passing through the crossing is steered clear of the nose. The clearances at check rails are so fixed that the nose of the crossing is protected under all service conditions. For this purpose maximum and minimum check rail clearances for BG have been fixed at 48 mm and 44 mm respectively. For MG the figures are 44 mm and 41 mm respectively. To ensure safety, it is very important that track gauge at the crossing particularly opposite the nose is maintained exact. The provisions of gauge tie plate on the sleeper at the nose helps to achieve this objective.

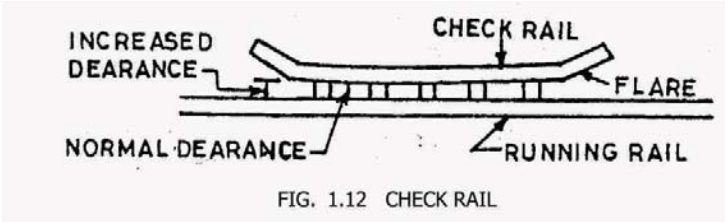

FIG. 1.12 CHECK RAIL

Check rails are so designed as to give the minimum clearance when used with 'flare' at the ends, but should any appreciable wear take place, the check rail can be moved towards the running rails by removing one or both of the 3 mm packing provided with the distance blocks between the check rail and the running rail.

The intersection of diamond crossings are not as effective as those in common process. To increase their effectiveness, check rail on all 1 in 8½ diamond crossing both on BG and MG are raised by 20mm, by welding a MS flat over their top table. For diamond crossing flatter then 1 in 8½ switch diamond are required to be used.

**1.5 Spring crossings (Fig.1.1.3)**

In all normal crossings the wheels have to negotiate a gap in the continuity of running rail while going on the straight or in turn out direction. With the use of spring crossing the gap in the straight direction can be avoided. In such a crossing one wing rail is moveable and is held against the vee of the crossing with a strong spring. When vehicles pass over to main track, there is no gap to be negotiated at

the crossing nose. In the case of vehicles moving on the turn out track, the sliding wing is forced out by the wheel flange and the movement beyond the wing is no different than no normal crossing.

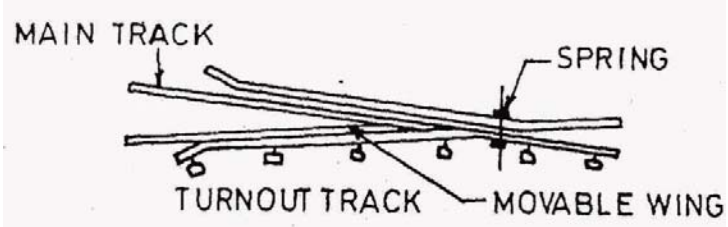

FIG. 1.13 SPRING CROSSING

Spring crossing are of great advantage at location where bulk of the traffic passes over the straight road and only little slow traffic on the turn out side. Such locations are emergency crossovers on double line at way side stations and slip siding points.

**Description of Common Terms used in Crossing Assembly**

1. **Theoretical nose of crossing (TNC) :** It is the point of intersection of the gauge line of a crossing and is used as a reference point for all calculation for turn outs or other track connections.
2. **Actual nose of crossing (ANC):** This is a point at which the spread of the gauage lines is sufficient to allow for an adequate thickness of the point, for consideration of manufacture and strength. For built up crossings, the thickness of the nose is generally kept equal to the web thickness of the rail section used.
3. **Throat of vee crossings :** It is a point at which the converging wing rail of the crossing are nearest to each other.
4. **Throat of obtuse crossing :** It is the point at which the converging elbow rail and the check rail of the obtuse crossing are closest.
5. **Flat bearing plates and canting of rails :** In the Indian Railways, all rails on points and crossings are kept vertical i.e. without any cant. Flat bearing plates are therefore used under rails on turnouts.

**1.7 TURNOUTS (FIG.1.14.)**

It is an arrangement of points and crossings with lead rails by means of which rolling stock may be diverted from one track to another.

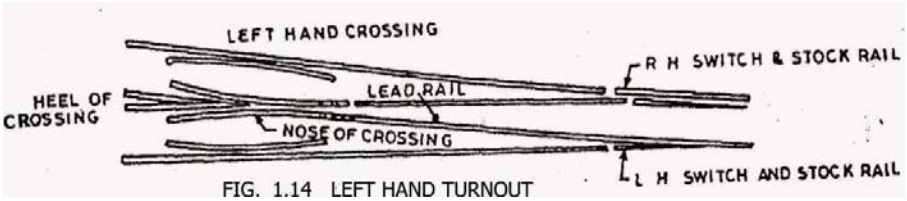

FIG. 1.14 LEFT HAND TURNOUT

**Description of Important Terms used in Turnouts**

1. **Lead of turnout :** It is a distance from the theoretical nose of the crossing to the heel of the switch measured along the straight.
2. **Overall length :** It is the distance from the end of stock rail to the heel of the crossing measured along the straight.

3. **Left hand turnout :** It diverts a train to the left of the straight main line or of the more important line in the case of a turnout from a curve. A right hand turnout does the same in the right direction. In both LH and RH turnouts, the built up crossing used is left handed, i.e. has the splice rail on the left.

**1.7.1 Symmetrical split Turnout:** In this layout the straight track is diverted into two opposite direction using the same radius for both the track of the turnouts. Since the direction is divided equally on both side, the crossing centre line coincides with the centre line of the straight track. This is contrary flexure layout in which the degree of the turnout curve will become half and the radius doubled. Lead of the turnout will remain the same. Further details can be worked out applying the principle of ordinary turnout.

This type of layout is used at way side station on end of loop line to provide sand humps also known as snag dead end. Even by using 1 in 8½ layouts, one gets the radius of 1 in 12 turnouts, which is the minimum prescribed for the movement of passenger trains. The sand hump also diverts away the runway vehicles there by improving the safety on the main line.

## 1.8 OTHER COMMON LAYOUTS

### 1.8.1 Diamond crossings (Fig.1.1.5)

When one track crosses an other at an angle, a diamonds is formed comprising of two acute and two obtuse crossings. When a vehicle passes over a diamond crossing, there is an inherent risk of derailment owing to a large unguided gap at the elbow of the obtuse crossing and due to the possibility of a wheel, particularly of a small diameter, being deflected to the wrong side of the nose. The position becomes worse, when the angle of intersection is very acute. In the Indian Railways, it has therefore been laid down that diamond crossing normally should not be flatter and less acute then 1 in 8 ½.

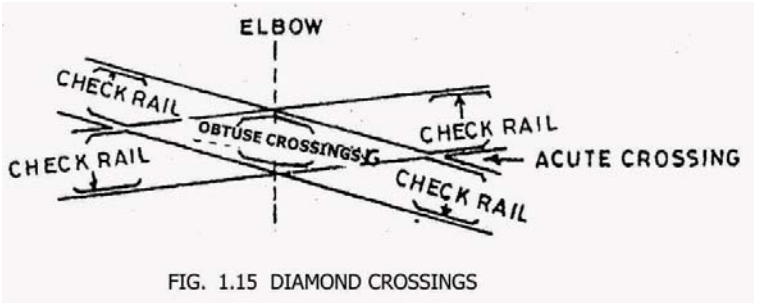


FIG. 1.15 DIAMOND CROSSINGS

### 1.8.2. Square Crossing (Fig.1.16)

When two tracks cross one another at right angles, a square crossing is formed. Square crossings are generally avoided, since the gap in the running rail for wheel flanges, being opposite to each other, causes severe jolting to vehicles resulting in the rapid wear of the crossings and damage to rolling stock on account of the heavy impact.

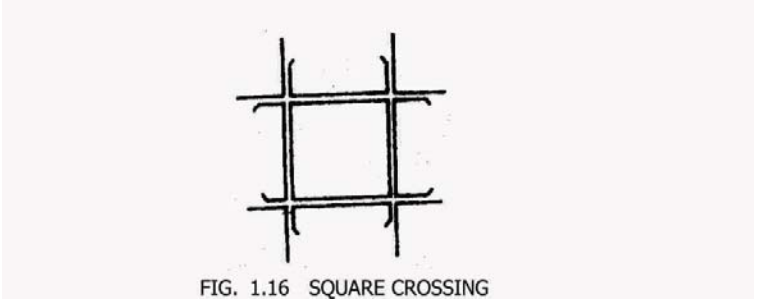

FIG. 1.16 SQUARE CROSSING

### 1.8.3. Moveable Switch Diamond

Movable switch diamonds are used for flatter crossing angles i.e. 1 in 10 or 1 in 12, where normal crossing is not permitted as mentioned in 1.8.1.

**Diamond Crossings with slips (Fig.1.17)**

If track are to be so arranged that a train on one track may normally cross another track, but when required, may also be diverted to that track, an arrangement known as diamond crossing with slips is installed. This is made possible by the inclusion of two or four pairs of switches, with the connecting lead rails. When such diversion is permitted in one way the arrangement is known as single slips, and if it is permitted in both ways, the arrangement is known as double slip.

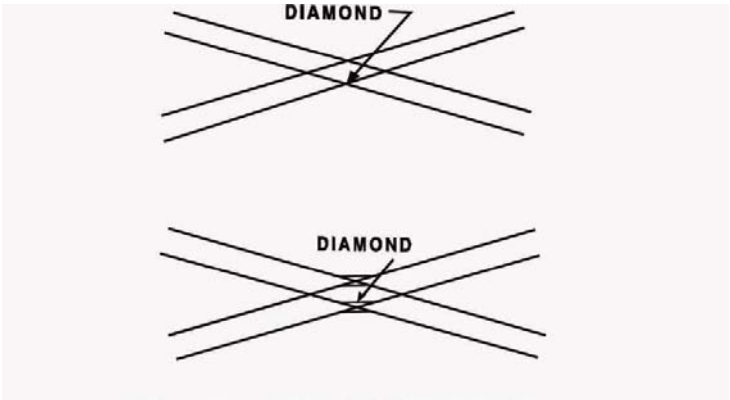


FIG. 1.17 DIAMOND CROSSING WITH SLIP

**1.8.4 Scissors Crossover**

When two crossover overlap exactly opposite to each other, a scissors cross over is formed. It consists of 4 turnouts and diamond crossing. The same function can be performed by two crossovers following one after the other, but the advantage in scissors crossover is the saving of space. This is commonly used in busy passenger yards when two train are dealt with on a single long platform.

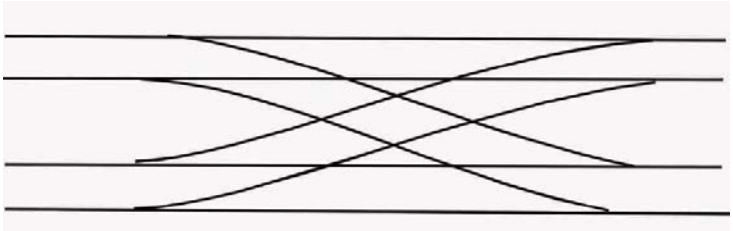

FIG. 1.18 SCISSORS CROSSOVER

**1.8.5 Triangles (Fig.1.19)**

Triangles are laid for turning engines, or vehicles end to end in place of turn tables. They are laid when space is available. Their maintenance cost is very little as compare to turn tables. It consists of two 1 in 8½ turnouts, one 1 in 8½ symmetrical split with connecting rail.

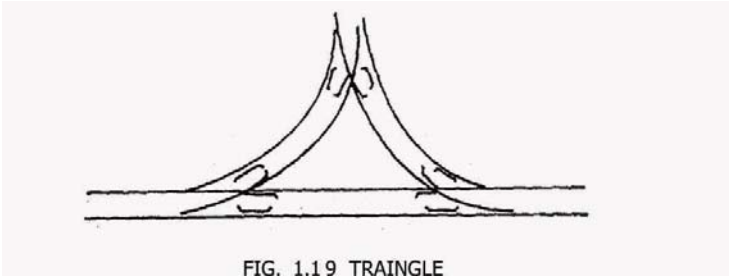

FIG. 1.19 TRAINGLE

**1.8.6 Gathering lines (Fig.1.20)**

A gathering line or a ladder track is one into which a number of parallel track merge. This layout is commonly used in goods yard.

FIG. 1.20 GATHERING

**Gauntleted Track (Fig.1.21)**

It is an arrangement in which two track of the same or different gauges are carried together for a certain length. The arrangement is useful, when both BG and MG track is to be carried together on the same bridge. Gauntlet track has two crossings of the same gauge or mixed gauge, at either ends, without any switches.

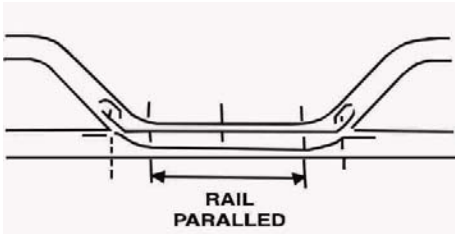


FIG. 1.21 GAUNTLET TRACK

## 1.9 INSPECTION AND MAINTENANCE OF SWITCHES AND CROSSINGS

### 1.9.1 Maintenance (General)

1. In big yards regular cycle of maintenance covering all points and crossing should be made.
2. Cess should be kept low for efficient drainage. Adequate ballast cushion should be provided.
3. Sleeper should be at correct spacing.
4. There should be no junction fish plates at stock rail joints or at the heel of crossings. At least one rail length on either side should be of the same section.
5. Use of spherical washers at appropriates places is very important and must be ensured.
6. At all places in point and crossings, the gauge should be uniform except at a point just ahead of the toe of a switch, where it will be slightly slack (enough to house the tip)
7. The clearance at the toe heel of switch, at check rail and wing rails must be maintained with in prescribed tolerances.
8. Adequate creep anchors should be provided to arrest creep. Box anchoring of at least one rail length ahead of stock rail is recommended. In case of PRC sleeper layout with elastic fastening creep anchors need not be provided.
9. It is desirable to weld stock and lead rail joints.

### 1.9.2 Maintenance of switches

1. In case of straight switches, correct bend to stock rail at the theoretical toe of switch should be ensured.
2. Bent Tongue rail should be straightened. Badly worn and damage stock and tongue rails should be replaced by serviceable ones. A tongue rail may be classified worn or damage when;

(a) It is chipped or cracked over a length of 20cm within 1 metre from its toe.

(b) It does not house properly against stock rail causing a gap of more than 5mm at the toe.

(c) The wear on tongue rail should not exceed the following limits :

(i) Vertical wear : 8mm for 60 kg, 5mm for 52kg and 90 R.

(ii) Lateral wear to be measured 13 to 15mm below the rail table 8mm for 60kg, 6mm for 52kg and 90R rail and 5mm for 75R and 60R rail.

3. Tongue rail should bear evenly on all slide chairs. This will be ensured when all sleepers are well packed.

4. When the tongue rail is in closed position, it must bear evenly against distance studs and blocks.
5. All bolts on switches should be kept tight except those at the heel of loose heel type switches where the first two bolts in the tongue rail should be finger tight and the other two in the lead rail spanner tight. On such switches a bend is given to the fish plate at loose heel joint equal to throw of switch x half length of fish plate/length of tongue rail.
6. Wear on switches can be reduced by lubrication of the gauge face of the tongue rail.
7. Plate screws and fang bolt should be used with slide chairs and not round spikes.
8. On prc T/O, rail screws provided on slide/spl chairs shall be lubricated to prevent from being jammed.
9. For better life of the rails in T/O, lubrication of gauge face on outer rail in T/O side shall also be lubricated along with tongue rails.

**1.9.3 Maintenance of Crossing**

1. Proper maintenance of gauge at crossing is very important. Any damage to nose of crossing or excessive lateral wear to the wings or check rails may have its origin in poorly maintained gauge.
2. Maximum vertical wear on wing rail at nose of crossing should not exceed 10mm. Crossing should be reconditioned replaced before reaching this limit.
3. When steel trough sleeper are used in crossing, the use of wooden blocks under them help in better maintenance.
4. For CMS crossings, gapeless joints must be en ensured for better running and preventing possibility of rail end fracture.

**1.9.4 Maintenance of lead Portion and Turn in Curves**

1. The curve lead should be laid by offsets from the gauge face of the straight track or by versine measurement. In later case stations at 1.5 m intervals should be marked and the versine checked on 6.0 metre chord. If there is variation in versine, track is to be attended. The turn in curve should also be checked for condition of sleepers and fastenings.

**1.9.5 Schedule of inspections of points and crossings :**

(a) **JE/SSE's inspection :**SSE in-charge and his JE/SSE should carry out inspection of points and crossing in passenger running lines once in three months and other lines once in six months by rotation.

(b) **AEN's inspection :** The AEN should inspect points and crossing on passenger lines once a year and 10 percent of other points and crossing every year.

(c) **DEN's inspection :** A few points and crossings in running lines, at his discretion, particularly those recommended for renewals.

(d) All inspection should be done as per the proforma laid down for this purpose.

PROFORMA CAN BE ATTACHED FOR INTERMEDIATE/DETAILED INSPECTION.

| | | | | |
|---|---|---|---|---|
| Station: | | Point No: | | |
| Location: | | Rail Section: | | |
| Type of Sleeper/Assembly: | | Angle of crossing : | | |
| Nominal Gauge of T/out: | | Left Hand or Right Hand : | | |
| Laid on Straight or on curve of Radius: | | Similar/Contrary Flexure: | | |
| Date of Laying sleepers (mm/yyyy): | | Type of crossing: | | |
| Details of Deep screening: | 1st | 2nd | 3rd | 4th |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Date(mm/yyyy): | | LH | RH | Action taken | LH | RH | Action taken | |
| Manual/Mechanised | | | | | | | | |
| Date of laying new/reconditioned Crossing | 1st | | 2nd | | 3rd | | 4th | |
| Crossing Unique No: | | | | | | | | |
| Manufacture: | | | | | | | | |
| Date of Laying new/Reconditioned switch - (mm/yyyy): | 1st | | 2nd | | 3rd | | 4th | |
| LH: | | | | | | | | |
| RH: | | | | | | | | |
| | | | | | | | | |

## I) General

1) Condition of ballast and drainage in turnout. (clean cushion to be measured only once in a year)

| LH | | RH | | Action taken | LH | | RH | | Action taken |
|---|---|---|---|---|---|---|---|---|---|
| Dt. Of Inspection | | | Action taken with date&sign | | Dt. Of Inspection | | | Action taken with date&sign | |
| | | | | | | | | | |
| | | | | | | | | | |

## II) Switch Assembly and Lead

2) Condition of sleepers, slide chairs, plate screws,heel and distance blocks, other fittings of switch including tightness of bolts

etc :

| Dt. Of Inspection | Action taken with date&sign | Dt. Of Inspection | Action taken with date&sign |
|---|---|---|---|
| | | | |

3) <u>Condition of Tongue Rails:</u>

a)Whether chipped or cracked over

200mm length within 1000 mm from

ATS.

b)Whether Twisted or bent (Causing gap of

5mm or more at toe)

c) Remarks over condition of tongue rail, whether it requires reconditioning or replacement.

4) Condition of Stock rail, burr formation to be mentioned specifically.

5) Creep and Squareness of tongue rail at toe of switch.

6) Straightness of straight stock rail if laid on straight:(measured on 7.5m chord)

7) Packing conditions under the switch assembly (preferably to be observed under traffic)

8) Throw of Switch:

9) Housing of Stock and Tongue rails:

10) Gap between top edge of leading stretcher bar and bottom of rail foot.

11) Working of SSD (if provided)

12) Gauge and Cross level in switch & Lead.

| Gauge | X-level | G | XL |
|---|---|---|---|
| | | | |
| | | | |

a) At 450m ahead of Toe of Switch:

b) At ATS between two stock rails:

c) Gauge And Cross Levels for ML and T/out side.
Versine of stock rail for turn out side upto end of lead.

| | Main Line | | | T/out | | |
|---|---|---|---|---|---|---|
| | G | XL | Ve | G | XL | Ve |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note-1) station no 0 to be marked at heel of switch for straight switch and ATS for curved switches. Subsequent stations shall be marked at every 3m. Versines to be recorded on 6m chord length commencing from station no-1. 2) Versine reading shall be taken for turnout side except for symmetrical split turnout where it shall be taken taken on main line . 3) In case of gap between T/R and S/R, that should be added to gauge measurement.

## III) Crossing Assembly :

13) Condition of Crossing:

a) Sign of propogation of crack (if any) in crossing assembly.

b) Burning on top surface at nose. c) In case of Heat treated welded crossing, weld texture on top surface.

If any flow or separation of weld portion .

d) Tightness of bolts at CI/distance block at toe, heel, and nose of crossing as applicable.

e) condition of gapless joint.

| | | | |
|---|---|---|---|
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| | | | |
| | | | |

14) Wear of crossing (to be measured with Straight edge at 100mm from ANC)

| LH wing rail | Nose | RH wing rail |
|---|---|---|
| | | |

For CMS crossing, actual wear for 52 kg section=

measured wear -2.0mm & actual wear for 60kg section=measured wear – 2.5mm.

15) Gauge and Cross level at crossing

| Main Line | | Turn out | |
|---|---|---|---|
| G | XL | G | XL |
| | | | |
| | | | |
| | | | |

a) 1m ahead of ANC

b) 150 mm behind ANC

c) 1m behind ANC

16) Condition of check rail fitting ie.bearing Plates, keys, blocks, bolts and elastic fastenings.

| Particulars | Details of Inspection | Action taken |
|---|---|---|
| | | |

17) Clearance of check rails:

a) Opposite ANC

b) At 1st block towards toe of crossing &

1st block towards heel of crossing

c) At the flared end towards heel &

at the flared end towards toe

18) Clearance of wing Rail (Only for Built up crossing):

| LH | | | RH | | | Action taken | | LH | | | RH | | | Action taken | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | St. no | | Ve | G | XL | | | | St. no | | Ve | G | XL | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
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## IV) Turn in Curve

Turn in curve – stations to be marked at

3m interval. Versines to be measured on

6m chord. Station no-0 to be marked at the centre of last long sleeper in case of PSC sleepers otherwise at heel of crossing.

| | | | |
|---|---|---|---|
| | | | |

20) Availability of 150mm additional ballast

Shoulder width on out side of turn in curve.

## V) General:

21) Any other special feature/defects:

22) Signature of the Inspecting official with date.

| | | | |
|---|---|---|---|
| | | | |
| | | | |

(Note- Locations where the gauge and cross levels

are to be checked should be painted on the web of the rail.)