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प्राप्तांक
Marks Awarded :

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Course : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

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Date : _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

अनुदेशक के आद्यक्षर
Instructor Initial :

IRS – CLAMP TYPE ELECTRIC POINT MACHINE (HIGH STROKE – 220 mm) FIXED ON THICK WEB SWITCHES

AIM: Study of IRS Type of Electric point machine (High Stroke –220 mm) with clamp type of locking fitted on Thick Web Switches.

INTRODUCTION:

As per revised standard IV of interlocking, the use of clamp type point machine is desirable where the stock rail & tongue rail of switches, is physically locked by means of clamp. This locking is in addition to locking of switches in side point machine. These point machines are generally fixed on point lay out with thick web tongue rail. Such point has opening of 160 mm compare to 115 mm in conventional point which facilitates 60mm opening at junction of rail heal (JOH). This prevents the repeated striking of the inner face of the wheel on open switch tongue rail at JOH. As such wide opening is not available in conventional switches there may be chance of under wheel flashing at high speed.

In thick web switches opening of switch is 160mm. Both tongue rails are independent of each other and do not move at a time. There are no stretcher bars. This point machine has stroke of 220mm which necessary to meet sequence of locking and unlocking of physical locking arrangement of point.

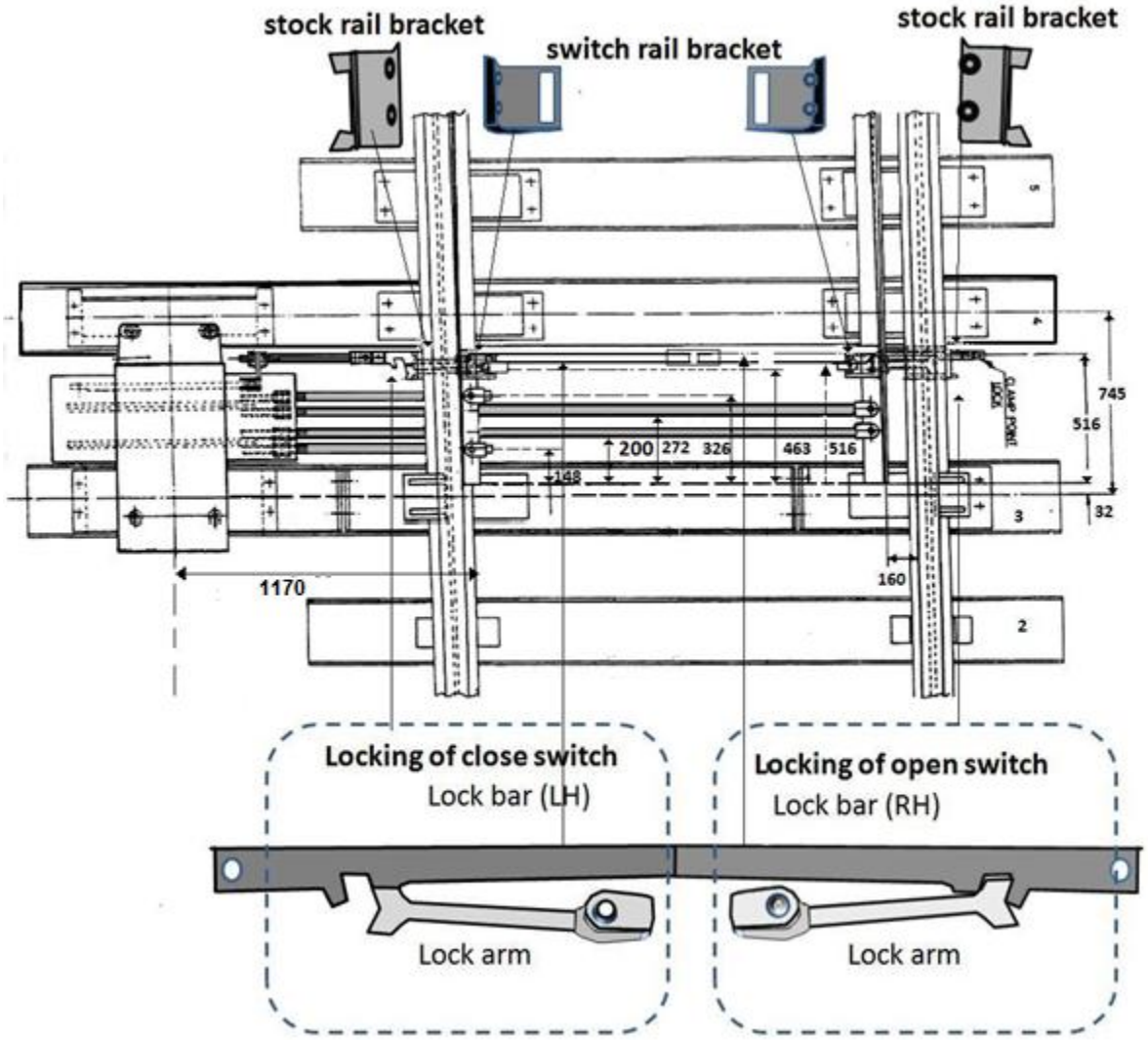
Distribution of 220 mm stroke			
SR	Throw	Effect on	
		Open switch	Close switch
1.	During First 60mm (only open switch tongue rail moves)	Moves 60 mm	Get unlock
2.	During next 100 mm throw (Both tongue rail moves together)	Moves anther 100 mm mm and now closed.	Moves 100 mm
3.	During next 60 mm	Get locked.	Moves 60 mm

Components of thick web switches
(RDSO Drawing No. RDSO/S-3454 for 60 kg rail and RDSO/S-3455 for 52 Kg rail)

The clamp locking and unlocking of the switches start with movement of throw. It is achieved with the help of beveled shape notches on the lock bar and shape of lock arm which are helpful in pushing the lock inside the notch and releasing the locking while the stroke is in progress.

The following parts are fixed on the stock rail and tongue rail of thick web switches to achieve physical locking of switches (clamp locking)

1. Switch rail bracket
2. Stock rail bracket
3. LH lock bar
4. RH lock bar
5. Lock arm



Thick web point lay out and components of clamp locking

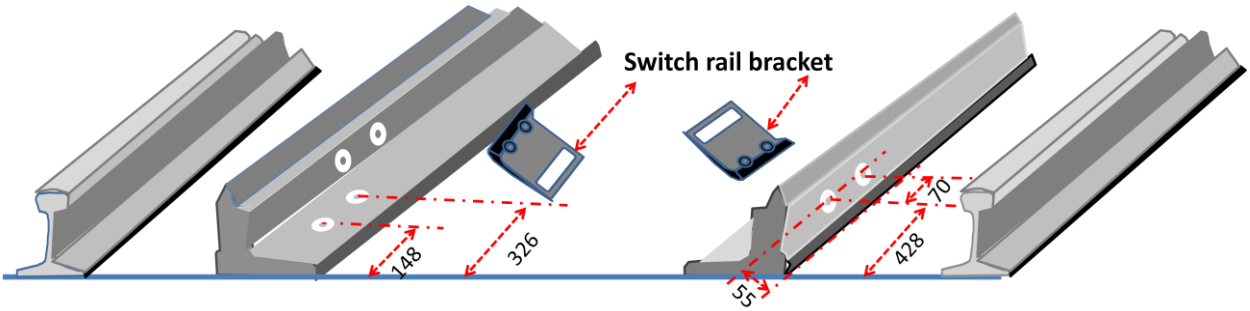
Switch rail bracket

Fixed on each switch rail and hold lock arm. Whenever tongue rail moves the lock arm also move along with it. Lock arm is used to lock OR unlock clamp locking.

As there are no stretcher bars and hence there is no scope for adjustment of opening of point. Opening is adjusted by putting packing strips in between switch rail bracket and switch rail.

The ground connections (lock rod & detection rods) are directly fixed on foot of tongue rails and marking for holes of ground connections are indicated in the drawing given bellow

Markings for fixing the switch rail bracket and ground connections on foot of rail

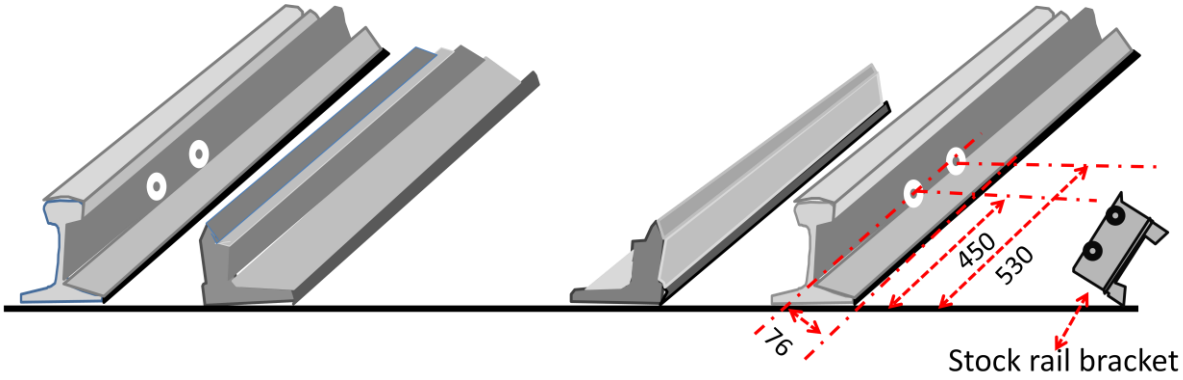


Hole marking for fixing lock/ detection rods
326mm (LH) OR 272 mm (RH) &
148mm (LH) OR 200 mm (RH)

Hole marking for fixing switch rail bracket

Stock rail bracket

It is fixed on stock rail. During operation of point the lock arm & lock bar moves inside this bracket. The inclined face of this bracket is useful in actuating clamp locking of point.



Hole marking for fixing stock rail bracket

Markings for fixing the switch rail bracket

Lock arm

It has arrow like structure on one end which is used in locking of the switch. There are two lock arms fixed on the switch rail bracket.

Lock bar (LH/RH)

This is a solid rectangular iron bar and connected to throw bar of point machine. There are two pieces in a lock bars i.e. LH & RH and they are insulated from each other. Each lock arm have a notch on its end which accommodates the head of lock arm. The inclined notches of lock arm are useful in pushing the lock arm outside it's notch when lock bar is moving.

Locking of switches- The lock arm fixed on switch rail bracket of tongue rail of close switch get locked between outer edge of stock rail bracket and inner surface of lock bar and hence the close switch as lock arm is fixed on switch rail bracket of tongue rail.

IRS HIGH STROCKE IRS POINT MACHINE:-

The majority of the features of this point machine are similar to the IRS low stroke point machine. The stroke of this point machine is increased at stroke conversion level (rotary to linear) by increasing no. of teeth(Three) on rack and pinion. This leads to increase in inter notch distance of lock slides, detection slides and gear rack (throw bar)

MAIN PARTS OF THE IRS CLAMP TYPE POINT MACHINE:

1. Base
2. D.C. Motor with gear box
3. Main gear (Transmission) assembly
4. Contactor unit (Control & Detection Contacts)
5. Drive bar with clamp lock
6. Locking (Internal) and Detection slides with rods.
7. Crank handle contact assembly
8. Cover with locks

OPERATING PARAMETERS:

1. Operating Voltage	: 110 V DC
2. Operating Current	: 5 Amps to 7 Amps
3. Operating Time	: 5 – 6 Sec.
4. Throw stroke	: 220 mm (60mm+100mm+60mm)
5. Capable to operate on switch opening	: Up to 160 mm
6. Slipping Current	: 1.5 to 2.0 times of working current.

EXERCISE-1

MAIN GEAR & FRICTION CLUTCH: Identify the following components and state their purpose:

a. Gear Rim.

b. Slip Rim.

c. Expansion Shoe Levers

d. Helical spring.

e. Adjusting nut with lock and seal.

f Non-trailable block.

g. Drive disc with projection.

h. Stop rod.

i. Control disc

j. Lift out or Release disc.

EXERCISE-2

DETECTOR CONTACTS ASSEMBLY UNIT: Identify the following parts and their functions below:

1. Crank
2. Crank Axle
3. Bottom Roller
4. Top Roller.
5. Contact & Terminal blocks
6. Finger contacts
7. Spring.
8. Spring base with fixing rod.

EXERCISE-3

Observations : measure the following parameters

1.Starting Current :_____ Amps

2. Working Current/Voltage : _____ Amps/

: _____ Volts

3.Slipping Current : _____ Amps

4.Working/Operation time : _____Seconds

POINT THROW: Crank handle the machine from one position to the other and note the following.

1. Number of motor rotations =

2. Movement of throw bar = mm.

3. Note below the checks to be carried out during inspection:

4. Note below the oiling & lubrication particulars of the machine parts:

EXERCISE-4
Components of clamp locking & ground connection and there measurements :
(RDSO Drawing No. RDSO/S-3454 for 60 kg rail and RDSO/S-3455 for 52 Kg rail)

The machine is a complete self-controlled mechanism which needs only long sleepers on the point layout for support and fixing and machine is installed in conjunction with points fittings which are shown in the figure. (Point Machine Layout).

1. Refer to the layout diagram of point machine and note the following.

a. Distance between the C/L of Point machine and gauge-face of the nearest stock rail =

b. Distance between the C/L of Third Point Sleeper and the Forth Point sleeper =

c. Distance between the lock bar and the switch toe. =

d. Distance between near end lock rod and switch toe =

e. Distance between the far end lock rod and switch toe
=

f Distance between the near end detection rod and switch toe =

g. Distance between far end detection Rod and Switch toe. =

h. Distance between the drive rod and 4^{th} point sleeper. =

i. Distance between the near end detection rod and 1st Pt. Sleeper. =

EXERCISE-5

4. OBSTRUCTION TEST & ADJUSTMENTS OF IRS CLAMP TYPE POINT MACHINE:

LOCKING TEST OR No go test:
1. Place a **5mm** obstruction test piece on the near end switch at **150mm from its toe**. Hand crank the machine to close this switch and further to see that the locking segment is obstructed in the notch of close switch lock slide, friction clutch slips & detection contact does not make.

2. Remove test piece and test again in same position of points. Make any slight adjustment necessary on close switch rail lock slide to see that the detection contacts close properly.

3. Repeat the above test for the other position of points to close the far end switch.

4. If point get lock during NO GO TEST (5mm) then make adjustment on close switch lock slide in such a way that lock segment will get slightly obstructed by inner edge of small notch and then tighten the nut & check nuts.

4**Spring test OR go test**

1. Place a **1.6 mm** obstruction test piece on the near end switch at **150mm from its toe**. Hand cranks the machine to close this switch and further to see that the locking segment is entered in the notch of close switch lock slide, detection contact just make.
2. Repeat the above test for the other position of points to close the far end switch.

S.NO	GAUGE	OBSERVATION
1	1.6 mm	Normal working i.e. Point Throw, Locking & Detection
2	3.25 mm	No detection (Just brakes) Note this test shall be done as per local railway instruction
3	5 mm	No detection, No locking & Slipping of friction clutch.

Carry out the obstruction test 5mm and GO TEST for both positions by operating point electrically from cabin.

Spring setting device (SSD):

This is a spring loaded mechanical device fixed on insulated tie plate of sleeper number 17 by permanent way department. SSD contains two cranks and they are connected with each other by means of spring loaded arm. Each tongue rail is connected to end of a crank of SSD. It is used for setting of close switch tongue rail with stock rail up to maximum possible length.

Questions:

1. What is the necessity of clamp type locking?

2. Write down differences between IRS high stroke and low stroke point machine

3. How do you adjust opening of 160 mm of switch?

4. Write down the names of various parts of IRS clamp type point machine?

5. How 220 mm stroke is distributed for operation of point?

6. What is the function SSD?

Date: **Signature of the Trainee**