GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

RAJYA SABHA
STARRED QUESTION NO. 126
ANSWERED ON 02.08.2024

MODERNISATION OF SIGNALING SYSTEM

*126. SHRI BABUBHAI JESANGBHAI DESAI:

Will the Minister of RAILWAYS be pleased to state:

(a) the steps taken by Government to enhance railway safety, including track maintenance and modernisation of signaling systems; and

(b) whether Government is planning to install a high sensitive signaling system to avoid accidents, if so, the details thereof?

ANSWER

MINISTER OF RAILWAYS, INFORMATION & BROADCASTING AND ELECTRONICS & INFORMATION TECHNOLOGY

(SHRI ASHWINI VAISHNAW)

(a) and (b): A Statement is laid on the Table of the House.

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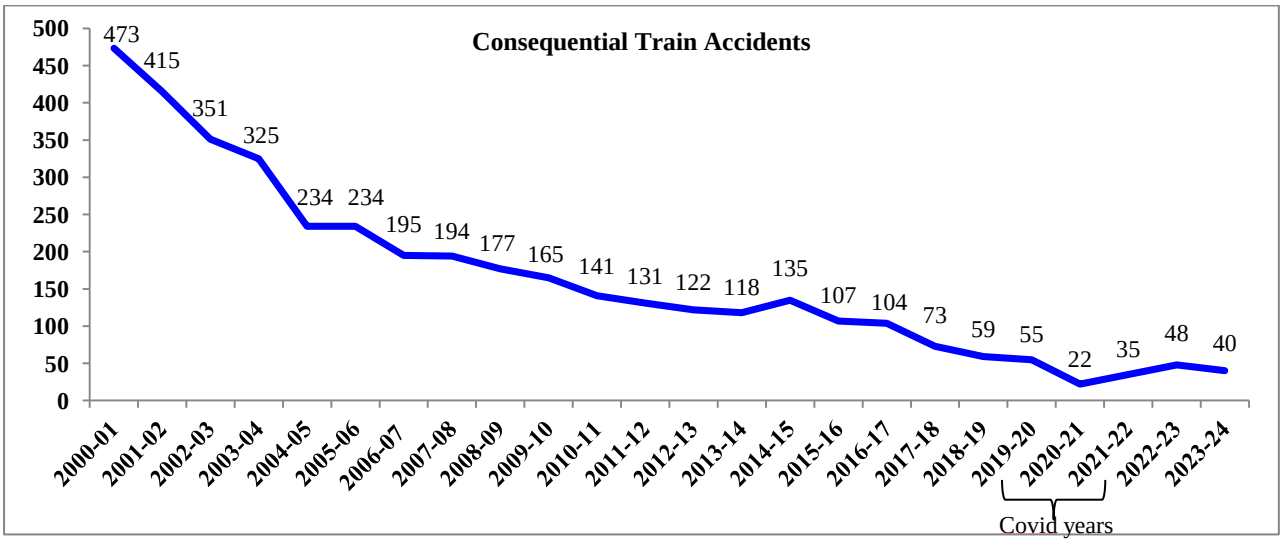
STATEMENT REFERRED TO IN REPLY TO PARTS (a) AND (b) OF STARRED QUESTION NO. 126 BY SHRI BABUBHAI JESANGBHAI DESAI ANSWERED IN RAJYA SABHA ON 02.08.2024 REGARDING MODERNISATION OF SIGNALING SYSTEM.

(a) and (b): As a consequence of various safety measures taken over the years, there has been a steep decline in the number of accidents. Consequential Train Accidents have reduced from 473 in 2000-01 to 40 in 2023-24 as shown in the graph below.

It may be noted that the consequential train accidents during the period 2004-14 was 1711 (average 171 per annum), which has declined to 678 during the period 2014-24 (average 68 per annum).

Another important index showing improved safety in train operations is Accidents Per Million Train Kilometer (APMTKM) which has reduced from 0.65 in 2000-01 to 0.03 in 2023-24, indicating an improvement of more than 95% during the said period.



Safety is accorded the highest priority on Indian Railways. The various safety measures including track maintenance and modernization of signalling systems taken to enhance safety in train operations are as under:-

1. On Indian Railways, the expenditure on Safety related works has increased over the years as under:

Expenditure on Safety			(Rs in Cr)
	2022-23 (Act)	**2023-24(Act)**	**BE 2024-25**
Maintenance of Permanent Way & Works	18,115	20,322	21,386
Maintenance of Motive Power and Rolling Stock	27,086	30,864	31,494
Maintenance of Machines	9,828	10,772	11,864
Road Safety LCs and ROBs/ RUBs	5,347	6,662	9,980
Track Renewals	16,326	17,850	17,652
Bridge Works	1,050	1,907	2,137

Signal & Telecom Works	2,456	3,751	4,647
Workshops Incl. PUs and Misc. expenditure on Safety	7,128	9,534	9,634
Total	**87,336**	**1,01,662**	**1,08,795**

2. Electrical/Electronic Interlocking Systems with centralized operation of points and signals have been provided at 6,589 stations up to 30.06.2024 to eliminate accident due to human failure.
3. Interlocking of Level Crossing (LC) Gates has been provided at 11,048 level Crossing Gates up to 30.06.2024 for enhancing safety at LC gates.
4. Complete Track Circuiting of stations to enhance safety by verification of track occupancy by electrical means has been provided at 6,609 stations up to 30.06.2024.
5. Axle counters for Automatic clearance of Block Section, BPAC (Block Proving Axle Counter) are provided to ensure complete arrival of train without manual intervention before granting line clear to receive next train and to reduce human element. These systems have been provided on 6079 Block Sections upto 30.06.2024.
6. A project for provision of Long Term Evolution (LTE) based Mobile Train Radio Communication system has been approved for 34,803 Rkms over Indian Railways.
7. The project for provision of Tunnel Communication has been taken up in various zonal Railways.
8. Emergency talk-back system and Emergency Alarm Systems have been provided in Vande Bharat Train sets.
9. CCTVs have been provided in all Vande Bharat Express coaches. Till date more than 9572 coaches are equipped with CCTV.
10. Detailed instructions on issues related with safety of Signalling e.g. mandatory correspondence check, alteration work protocol, preparation of completion drawing, etc. have been issued.
11. System of disconnection and reconnection for S&T equipment as per protocol has been re-emphasized.
12. All locomotives are equipped with Vigilance Control Devices (VCD) to improve alertness of Loco Pilots.
13. Retro-reflective sigma boards are provided on the mast which is located two OHE masts prior to the signals in electrified territories to alert the crew about the signal ahead when visibility is low due to foggy weather.

14. A GPS based Fog Safety Device (FSD) is provided to loco pilots in fog affected areas which enables loco pilots to know the distance of the approaching landmarks like signals, level crossing gates etc.
15. Modern track structure consisting of 60kg, 90 Ultimate Tensile Strength (UTS) rails, Prestressed Concrete Sleeper (PSC) Normal/Wide base sleepers with elastic fastening, fanshaped layout turnout on PSC sleepers, Steel Channel/H-beam Sleepers on girder bridges is used while carrying out primary track renewals.
16. Mechanisation of track laying activity through use of track machines like PQRS, TRT, T-28 etc to reduce human errors.
17. Maximizing supply of 130m/260m long rail panels for increasing progress of rail renewal and avoiding welding of joints, thereby improving safety.
18. Ultrasonic Flaw Detection (USFD) testing of rails to detect flaws and timely removal of defective rails.
19. Laying of longer rails, minimizing the use of Alumino Thermic Welding and adoption of better welding technology for rails i.e. Flash Butt Welding.
20. Monitoring of track geometry by OMS (Oscillation Monitoring System) and TRC (Track Recording Cars).
21. Patrolling of railway tracks to look out for weld/rail fractures.
22. The use of Thick Web Switches and Weldable CMS Crossing in turnout renewal works.
23. Inspections at regular intervals are carried out to monitor and educate staff for observance of safe practices.
24. Web based online monitoring system of track assets viz. Track database and decision support system has been adopted to decide rationalized maintenance requirement and optimize inputs.
25. Detailed instructions on issues related with safety of Track e.g. integrated block, corridor block, worksite safety, monsoon precautions etc. have been issued.
26. Preventive maintenance of railway assets (Coaches & Wagons) is undertaken to ensure safe train operations.
27. Replacement of conventional ICF design coaches with LHB design coaches is being done.
28. All unmanned level crossings (UMLCs) on Broad Gauge (BG) route have been eliminated by January 2019.
29. Safety of Railway Bridges is ensured through regular inspection of Bridges. The requirement of repair/rehabilitation of Bridges is taken up based upon the conditions assessed during these inspections.
30. Indian Railways has displayed Statutory “Fire Notices” for widespread passenger information in all coaches. Fire posters are provided in every coach so as to educate and alert passengers regarding various Do’s and Don’ts to prevent fire. These include messages regarding not

carrying any inflammable material, explosives, prohibition of smoking inside the coaches, penalties etc.

31. Production Units are providing Fire detection and suppression system in newly manufactured Power Cars and Pantry Cars, Fire and Smoke detection system in newly manufactured coaches. Progressive fitment of the same in existing coaches is also underway by Zonal Railways in a phased manner.
32. Regular counselling and training of staff is undertaken.
33. Concept of Rolling Block introduced in Indian Railways (Open Lines) General Rules vide Gazette notification dated 30.11.2023, wherein work of integrated maintenance/ repair/ replacement of assets is planned up to 52 weeks in advance on rolling basis and executed as per plan.

The details of Safety related works undertaken by Railways are tabulated below:

SN	Item	2004-05 to 2013-14	2014-15 to 2023-24	2014-24 vs 2004-14
	Track Maintenance			
1.	Expenditure on Track Renewal (Rs. In Cr.)	47,018	1,09,659	2.33 times
2.	Rail Renewal Primary (Track Km)	32,260	43,335	1.34 times
3.	Use of high-quality rails (60 Kg) (Km)	57,450	1,23,717	2.15 times
4.	Longer Rail Panels (260m) (Km)	9,917	68,233	6.88 times
5.	USFD (Ultra Sonic Flaw detection) Testing of Rails (Track km)	20,19,630	26,52,291	1.31 times
6.	USFD (Ultra Sonic Flaw detection) Testing of Welds (Nos.)	79,43,940	1,73,06,046	2.17 times
7.	New Track KM added (Track km)	14,985	31,180	2.08 times
8.	Weld failures (Nos.)	In 2013-14: 3699	In 2023-24: 481	87% reduction
9.	Rail fractures (Nos.)	In 2013-14: 2548	In 2023-24: 383	85% reduction
10	Thick Web Switches (Nos.)	Nil	21,127	
11	Track Machines (Nos.)	As on 31.03.14 = 748	As on 31.03.24 = 1,661	122% increase
	Level Crossing Gate Elimination			
1.	Elimination of Unmanned Level Crossing Gates (Nos.)	As on 31.03.14: 8948	As on 31.03.24: Nil (All eliminated by 31.01.19)	100% reduction
2.	Elimination of Manned Level Crossing Gates (Nos.)	1,137	7,075	6.21 Times
3.	Road over Bridges (RoBs)/ Road under Bridges (RUBs) (Nos.)	4,148	11,945	2.88 Times
4.	Expenditure on LC Elimination	5,726	36,699	6.40 Times
	Bridge Rehabilitation			
1.	Expenditure on Bridge Rehabilitation (Rs. In Cr.)	3,919	8,008	2 Times
	Signalling Works			
1.	Electronic Interlocking (Stations)	837	2,964	3.52 times
2.	Automatic Block Signaling (Km)	1,486	2,497	1.67 times

3.	Fog Pass Safety Devices (Nos.)	As on 31.03.14: 90	As on 31.03.24: 19,742	219 times
	Rolling Stock			
1.	Manufacture of LHB Coaches (Nos.)	2,337	36,933	15.80 times
2.	Provision of Fire and Smoke Detection System in AC coaches (Nos. Of Coaches)	0	19,271	
3.	Provision of Fire Detection and Suppression System in Pantry and Power Cars (Nos. Of Coaches)	0	2,991	
4.	Provision of Fire Extinguishers in Non –AC coaches (Nos. Of Coaches)	0	66,840	
	Budget allocation			
1	**Gross Budgetary Support for Railway Investment (Rs. In Cr.)**	**1,56,739**	**8,25,967**	**5.3 times**

Further following safety measures have also been taken over IR:

1. IR is installing KAVACH which is an indigenously developed Automatic Train Protection (ATP) system. Kavach is a highly technology intensive system, which requires safety certification of highest order.
2. Kavach aids the loco pilot in train running within specified speed limits by automatic application of brakes in case Loco Pilot fails to do so and also helps the train to run safely during inclement weather.
3. Implementation of Kavach involves execution of many activities, such as:
    a. Installation of Station Kavach at each and every station.
    b. Installation of RFID tags throughout the track length.
    c. Installation of Telecom Towers throughout the section.
    d. Laying of optical Fibre cable along the track.
    e. Provision of Loco Kavach on each and every Locomotive running on Indian Railways.
4. Kavach has so far been deployed on 1465 Route km and 144 locomotives on South Central Railway.
5. Presently, the progress of main items related to Kavach on Delhi– Mumbai & Delhi– Howrah corridors (approximately 3000 Route km) is as under:
    (i) Laying of Optical Fibre Cable: 4275 Km
    (ii) Installation of Telecom Towers: 364 Nos.
    (iii) Provision of equipment at Stations: 285 Nos.
    (iv) Provision of equipment in Loco: 319 Locos
    (v) Installation of Track side equipments: 1384 RKm.
6. Indian Railways has also prepared Detailed Project Report (DPR) and Detailed Estimate on another 6000 RKm.

7. On 16.07.2024, Kavach 4.0 specification has been approved by RDSO. This version covers all the major features required for the diverse railway network. This is a significant milestone in safety for Indian Railways. Within a short period, IR has developed, tested and started deploying Automatic Train Protection System.
8. Kavach is provided progressively in phased manner.

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