Understanding the Kavach system

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Why in News:

The death of over 288 passengers in the ghastly train accident recently at Bahanaga Bazaar railway station in the Balasore district of Odisha has brought into sharp focus the safety mechanisms needed to prevent such tragedies.

About Kavach System

The KAVACH is an indigenously developed Automatic Train Protection (ATP) system by the Research Design and Standards Organisation (RDSO) in collaboration with the Indian industry.

The trials were facilitated by the South Central Railway to achieve safety in train operations across Indian Railways. It is a state-of-the-art electronic system with Safety Integrity Level-4 (SIL-4) standards.

It is meant to provide protection by preventing trains to pass the signal at Red (which marks danger) and avoid collision. It activates the train's braking system automatically if the driver fails to control the train as per speed restrictions.

In addition, it prevents the collision between two locomotives equipped with functional Kavach systems. The system also relays SoS messages during emergency situations.

An added feature is the centralised live monitoring of train movements through the Network Monitor System. 'Kavach' is one of the cheapest, SIL-4 certified technologies where the probability of error is 1 in 10,000 years.

Functioning of Kavach on Railway Systems

The Traffic collision avoidance system (TCAS), with the help of equipment on board the locomotive and transmission towers at stations connected with Radio Frequency Identification (RFID) tags, helps in two-way communication between the station master and loco-pilot to convey any emergency message.

The instrument panel inside the cabin helps the loco-pilot know about the signal in advance without visual sighting, and the permissible speeds to be maintained.

If a red signal is jumped and two trains come face to face on the same line, the technology automatically takes over and applies sudden brakes.

Additionally, the hooter activates by itself when approaching a level crossing which serves as a big boon to loco-pilots during fog conditions when visibility is low.

Status of Implementation of Kavach System

The Union Railway Minister Ashwini Vaishnaw inspected the trial of the Kavach working system between Gullaguda-Chitgidda Railway stations on Lingampalli-Vikarabad section in the Secunderabad Division of South Central Railway last March.

The South Central Railway (SCR) Zone is a pioneer in the implementation of the KAVACH – (TACS). The Kavach system has been deployed over 1,465 kms in the SCR limits in 77 locomotives and 135 stations till March this year.

Additionally, the Secunderabad-based Indian Railways Institute of Signal Engineering & Telecommunications (IRISET) hosts the 'Centre of Excellence' for Kavach.

IRISET has been mandated by the Railway Board to train the in-service railway staff on Kavach. The Institute's Kavach lab carries out round the year training programmes.

Both the Shalimar-Chennai Coromandel Express and the Yeshwanthpur-Howrah Express were not fitted with KAVACH-TACS.

The Kavach system project is yet to be implemented on the Howrah-Kharagpur-Chennai line. However, Jaya Varma Sinha, a member of the Operation and Business Development, Railway Board, reasoned that the reaction time and distance were very short as the train was travelling at a very high speed.

If an obstruction comes suddenly in front of a high-moving vehicle then no technology in the world would prevent an accident

Kavach deployment strategy

Kavach implementation is being taken up in a focused manner by the Railway Board. The first priority are the High Density Routes and the New Delhi-Mumbai and New Delhi-Howrah Sections, as they have higher chances of accidents because the trains run closer to each other.

The second priority lines are the Highly Used Networks, the third ones are other Passenger High Density Routes and the final priority is of course to cover all other routes.

The RDSO has approved three firms —Medha Servo Drives, HBL and Kernex — for providing Kavach equipment with two more being in the pipeline.

Glitches about vulnerability of a vehicle crossing a closed level crossing, stray cattle or boulders on track, radio communication issues in tunnels, ghat sections, have been tackled.

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