

Kavach, an indigenously developed Automatic Train Protection System

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In news- India tested indigenously developed Automatic Train Protection System on South Central Railway recently.

About Kavach(Train Collision Avoidance System)-

- It is India's very own automatic protection system in development since 2012, under the name **Train Collision Avoidance System** (TCAS), which is named as Kavach or "armour".
- **It is a set of electronic devices and Radio Frequency Identification devices installed in locomotives**, in the signaling system as well the tracks, that talk to each other **using ultra high radio frequencies to control the brakes of trains and also alert drivers**, all based on the logic programmed into them.
- **One of its features is that by continuously refreshing the movement information of a train**, it is able to send out triggers when a loco pilot jumps signal, called **Signal Passed at Danger (SPAD)**, a grave offense in railway operations with respect to safety, and the key to accidents like collision.
- The devices also **continuously relay the signals ahead to the locomotive, making it useful for loco pilots in low visibility, especially during dense fog.**
- It includes the key elements from already existing, and tried and tested systems like the European Train Protection and Warning System, and the indigenous Anti Collision Device.
- It will also carry **features of the high-tech European Train Control System Level-2 in future.**

- **The current form of Kavach adheres to the highest level of safety and reliability standard called Safety Integrity Level 4.**
- It is designed to bring a train to a halt automatically when it notices another train on the same line within a prescribed distance.
- **Trains will also stop on their own when the digital system notices any manual error like “jumping” of the red signal or any other malfunction.**
- The **‘On-Board Display of Signal Aspect’ (OBDSA)** is to help loco pilots check signals on board consoles.
- **RFID tags are provided on the tracks and at the station yard for each track and signals** for track identification, location of trains and identification of train direction.
- Once the system is activated, all trains within a 5-km range will halt to provide protection for trains on adjacent tracks.
- In the new avatar, India wants to position Kavach as an exportable system, a cheaper alternative to the European systems in vogue across the world.
- While **now Kavach uses Ultra High Frequency, work is on to make it compatible with 4G Long Term Evolution (LTE) technology** and make the product for global markets.
- The **Research Designs and Standards Organization (RDSO) in Lucknow** along with private vendors are developing the system.
- **Once rolled out, it may be the world’s cheapest Automatic Train Protection System** with the cost of rollout pegged at around Rs 30 lakh to 50 lakh per kilometer, a fourth of the cost of equivalent systems globally.
- In the next phase, the Kavach system will also be able to recalibrate as per temporary speed restrictions en route, something the system does not yet have.

- **Kavach has been deployed on over 1,098 km and 65 locomotives in ongoing projects of the South Central Railway.**
- **In future it will be implemented on 3000 km of the Delhi-Mumbai and Delhi-Howrah corridors** where the tracks and systems are being upgraded to host a top speed of 160 kmph.
- Further, over 34,000 km on the High Density Network (HDN) and Highly Utilized Network (HUN) of the Golden Quadrilateral have been included in its sanctioned plans.