



# Terminal Ballistics Research Laboratory (TBRL)



# About the Lab

**Terminal Ballistics Research Laboratory (TBRL)** was envisaged in 1961 as one of the modern armament research laboratories under the Department of Defence Research & Development. The laboratory became fully operational in 1967 and was formally inaugurated in January 1968 by the then Defence Minister. The laboratory has its headquarter at Sector-30, Chandigarh and technical area, known as TBRL Ranges is located at village Ramgarh, Distt. Panchkula, Haryana.

TBRL has been involved in the design & development of missile warhead systems, electronic fuzes, multi-mode hand grenades, bund blasting device, ammunition for low intensity conflict, Baffle Ranges for army and paramilitary forces etc. TBRL has also developed the technology for shaped charges and explosive formed penetrators for anti-tank, anti-ship and anti-submarine applications.

# RAIL TRACK ROCKET SLEDGE

Length	3830 m
Gauges	0.7 m to 4.8 m
Alignments	$\pm 1$ mm
Max. Load Capacity	50 ton at any point
Recovery Moses	Sand & Air Brake, Retro rockets
Diagnostics	Radio Telemetry On-Board Instrumentation Real time Velocity Measurement Onboard Vibration Measurement
Maximum payload and velocity	Payload: 1200 kg, Mach 1.2
Maximum velocity	Mach 2.0

## Applications of RTRS facility

- | Escape System Testing for Fighter Aircrafts.
- | Impact & Penetration Studies of Warheads/Bombs.
- | Evaluation of Fuzes.
- | Evaluation of sub-systems of Missiles.
- | Air Defence Target-Interceptor Interaction Study.
- | Evaluation of Parachutes & Recovery Systems



# Post Impact delay fuze for **AIRCRAFT DELIVERED BOMB**

## Product Technology Achievement

TBRL has developed a 4th generation ESAD technology based electronic post impact delay fuze for air delivered bomb. EBW detonator based in-line explosive train is incorporated in the fuze to enhance the safety during storage, transportation and usage. The developed fuze is compatible with 2" fuze well and can be upscaled to 3" fuze well. PID Fuze is modular and fail safe. Operational features are Instantaneous functioning on impact and Short delay (10 ms to 10s). Safeties are in the form of Lanyard switch & 27V Aircraft pulse as Launch platform safety and Turbo generator as Post launch safety.

ToT of this product is completed





# LRGB Warhead

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## Product Technology Achievement

Deeply buried facilities are extremely challenging targets for destruction with the available monolithic warhead technology. To overcome the limitations of monolithic warheads while engaging deep buried hardened targets, Tandem warhead technology has been developed. Tandem warhead comprises of two warheads working in sequence the Shaped Charge warhead is the first stage followed by follow through projectile filled with high explosive which induces impulsive loading of target structure causing damage on the inside of the target by blast and fragmentation effects.

- ▶ Successfully demonstrated perforation of thick RCC by Tandem Warhead in dynamic trial.
- ▶ Lethality parameters of the warhead successfully validated in static trial.



LRGB Tandem Warhead System

# Fuzing System for Hard Target Penetration Warheads

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## Product Technology Achievement

TBRL has developed an electronic safe and arm device (ESAD) based in-time fuzing system for tandem warhead to defeat Hardened and buried structures. The fuzing system is a combination of two fuzes namely precursor charge warhead (PCW) fuze and Follow through projectile warhead (FTP) fuze. The PCW Fuze gets initiated on impact of the weapon with the target whereas the FTP fuze is of post impact delay type and gets initiated after a set delay. The Fuzing command on impact is provided through an impact switch located at the nose of weapon system. FTP fuze is programmable through RS-422 communication link. Adequate safeties as per the bomb requirements for safe handling during storage, transportation and use are provided. This product has successfully completed penetration trials at RTRS in TBRL, Ramgarh Ranges. The product has very good potential for export.





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