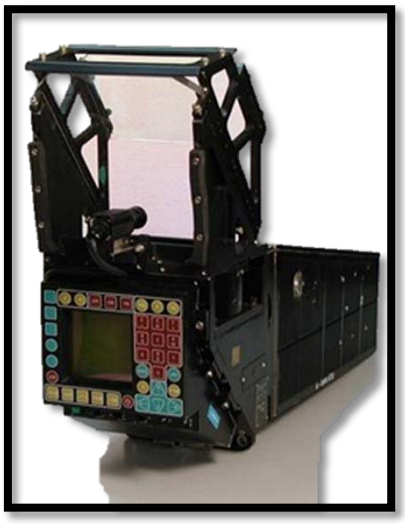
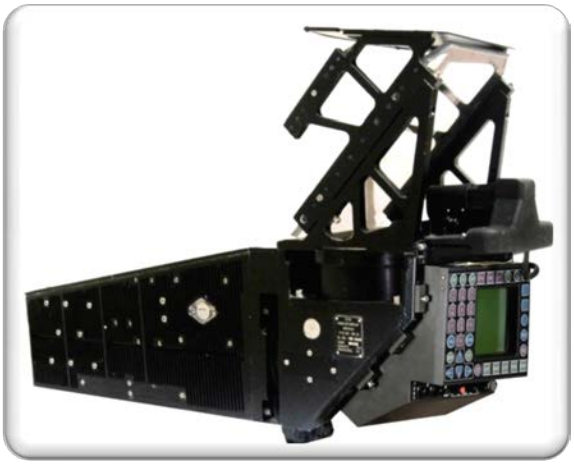
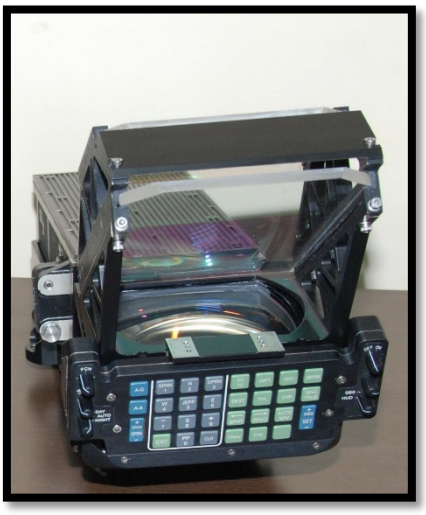
Name of the Technology/Product

Laboratory Name	CSIR-Central Scientific Instruments Organisation, Chandigarh
Brief Profile of Technology/ Product	**Head-Up Display (HUD)** is an essential aid to the pilot of aircraft, especially fighter aircraft. It is a transparent display that presents data without requiring the pilot to look away from his usual viewpoint. The information is projected on to the display surface which is usually referred to as the beam combiner, through a combination of special projection technology, optical assembly and display source. HUD displays flight information such as altitude, airspeed, angle of attack, navigation, weapon aiming and other flight information in collimated form so that the pilot is able to view the information with his head "up" and looking forward, instead of looking down on other instruments mounted in the cockpit. It can also be used to adequately overlay imagery that has a physical relation to the real environment, which makes the information easier to apprehend, such as the runway symbology under poor weather conditions. HUD interfaces electronically with Open Architecture Computer (OAC) of the aircraft and generates deflection signals i.e. symbology and characters. The HUD accepts these deflection signals and converts them into the optical image seen by the pilot.
Returns/Benefits	• Globally competitive, at par with international standards • Technology (HUD Mark-I for Light Combat Aircraft: LCA-Tejas AF Ver.) transferred to Bharat Electronics and in regular production from last 5 years; Generation of Know-how fee of Rs 1.05 Crores (approx. till date) & Royalty @ 3.5% • Foreign exchange saving @ Rs. 40 Lakhs per unit (approx.) • HUD technology also successfully developed for Intermediate Jet Trainer Aircraft (IJTA) and the LCA-Navy Aircraft • Indigenous technology available with state of art features and specifications • Adaptable to various platforms owing to its modular structure
Validation Level	DGAQA approved full qualification testing which conforms to MIL standard 810D, 461C and 704D Airworthy certification and successful flight trials at various aircraft platforms
IPR Status [also indicate status of the patent (if any) in 2015]	---NA---
End product price (if not available, estimated price)	--

Technology/Product Collaborator	• Aeronautical Development Agency (ADA), Bangalore • Hindustan Aeronautics Limited, Bangalore, Korwa • Bharat Electronics Limited, Panchkula & Machilipatnam
Relevance of Technology in present times	HUD is normally used for military aviation applications but now-a-days it is also used for civilian airborne and surface transport applications with little variations.
Similar technology/product developed	• Head Up Display for LCA-Navy • Head Up Display for IJTA.
Picture of the technology/ product (if any, with good resolution)	 Head Up Display for LCA AF  Head Up Display for LCA Navy



Head Up Display for HJT 36

HUD Symbology