Head up Display (HUD H-Series) for Intermediate Jet Trainer Aircraft

Introduction

The HUD is prime flight display used by modern day aircraft pilots which presents flight information/data without requiring pilot to look away from his/her usual viewpoint. The information is projected at infinity using combination of special projection technology comprising optical assembly, folding mirror and display source. A pair of multilayer semi-reflective optical thin film coated glasses called as beam combiner combines outside view and the flight information such as altitude, airspeed, angle of attack, navigation, weapon aiming and other flight information. This combined information is available to the pilot in collimated form so that the pilot can view the information with his/her 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 H Series in IJTA Cockpit

HUD H-Series for Hindustan Jet Trainer Aircraft (HJT-36) has been developed with several state-of-the-art features. The challenge of HUD design for HJT-36 Aircraft has been huge owing to the requirement of very compact size, low weight and requirement of thermal management without forced air cooling within the available HUD geometry. The unit has been tailored for HJT-36 Cockpit with high field of view of 25°, Instantaneous field of view of 20° in elevation and 18° in azimuth. The biggest achievement has been the low weight of HUD along with mounting tray. The thermal management without forced air cooling has been achieved due to its excellent mechanical modelled structure and very low power consumption. The feature of electronic standby (SBS) has been built-in into the system to provide critical display to the pilot in case both the mission computers fail. SBS provides the necessary flight data to the pilot through standard Graticule scale which is controlled through a knob provided on Data Entry Panel(DEP). User friendly DEP provides the pilot interface to the mission computer while automatic brightness control

maintains the comfortable contrast level of the symbology to the pilot ensuring sun light readability and good contrast at lower ambient brightness levels.

Specifications

- Field of View (FOV), FOV (AZ), IFOV (EL) : 25°; 20°x 18°
- Brightness : 2400fL
- Modes of Operation :Stroke, Standby Sight Mode
- Power Consumption : <75W
- MTBF : > 8200 hours
- Built in Test :Comprehensive
- Electronic Standby Sight, Image Recording :Present
- Rear and Front Up Front Control Panel
- Thermal Management: : Fan-less
- Compliance :MIL-STD 704D, 810D, 704C
- Weight :12.5kg (with mounting tray)
- Parallax error :0°-6°: 1.3mR; 6°-12.5°: 2.3mR
- Symbol positioning accuracies limits :0°-5°:<1.5mR; 5°-10°: <2.0mR 10°-12.5°: < 3.6mR
- Binocular disparity :0°-6°:<1.0mR; 6°-12.5:<1.7mR
- Contrast ratio :≥1.2
- Brightness non-uniformity :1.5:1
- Bore sighting error: :< 1.0mR
- Line width :≤ 1.0±0.5mR
- Linearity :> 1.3% of FSD
- Jitter :< 0.5mR

Applications

- HUD with customized specifications for aircraft variants for Air Force and Navy Platforms.
- HUD for helicopters.
- Helmet Mounted Display.

- Head Mounted Display.
- HUD for Military Vehicles with IR capabilities.

Status

- Design & development of Head Up Display, Multi-functional Up-Front Control Panel, Rear Data Entry Panel, Mounting Platform, Automated Test Equipment & Bore Sighting Equipment for AJT/HJT 36 Aircraft: Completed
- The technology package comprises:
    - HUD comprising:
        - Pilot Display Unit (PDU)
        - Multi-Functional Up-Front Control Panel (MF-UFCP)
        - Rear Data Entry Panel (RDEP)
        - Mounting Tray
    - HUD Test Equipment:
        - HUD Functional Test Equipment (HFTE) to carry out functional testing of PDU, DEP & RDEP as per production ATP
        - ESS Test Bench including test software for PDU, DEP & RDEP
        - Automated Test Equipment (ATE) for electronic modules
        - Vibration Fixtures & Tools for PDU, DEP & RDEP.
        - Bore-sight Alignment System with Digital Readout (BASDR).
- Phase-I and Phase-II flight trials: Completed
- Phase-III flight trials: 03 flights completed successfully.