

Head Up Display HUD Mk1N-NP for Naval LCA

Introduction

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 semi-reflective transparent glass 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 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.



Head Up Display HUD Mk1-NP

Naval LCA gets only ~150 m length of airstrip to land and thus requirement of HUD with higher instantaneous field of view to see aircraft nose and ship deck clearly and thus also requiring arrestor landing shock resistance of 50g. It has a requirement of wide instantaneous field of view (IFOV) - Elevation 22° (19° below $+3^\circ$ above FRL) and Azimuth 20° . It is compatible with Naval Aircraft Carrier requirements of radiated susceptibility standard up to 200V/m along with the several features such as contrast ratio ≥ 1.2 , brightness non-uniformity: 1.5:1, and multimode operations: Stroke Mode for Day flights, Stroke in Raster in low visibility & night mode. It also has feature of real time communication with Mission computer for Human Machine Interface and Extensive online built in test.

Specifications

- The HUD Mk1N-NP technology has few critical, novel and stringent specifications specific to naval aircraft operation requiring stringent field of view (FOV) and environmental screening requirements.
- Higher nose drop of Navy Aircraft necessitates higher over the nose vision requirement through HUD to enable Deck landing, electronically and optically compatible with LCA-Navy.
- Field of View (FOV), FOV (AZ), IFOV (EL) : 25°; 20°x 22.5°
(19.5° below
+ 3°above FRL)
- Brightness : Normal cursive line
luminance at a
writing speed of
25°/ms: 2400fL,
Stroke in raster line
luminance at a
writing speed of
190°/ms: 1000fL;
Peak raster
luminance: 260fL
- Modes of Operation : Stroke, Stroke in
Raster Mode
- Power Consumption : <120W
- MTBF : >12000 hours
- Built in Test : Comprehensive
- Writing speeds : 25°/ms, 70°/ms,
190°/ms
- Electronic Standby Sight, Image Recording
- Rear and Front Up Front Control Panel
- Thermal Management: : Fan-less, convection
- Compliance : MIL-STD 704D,
810D, 704C
Higher electric
radiated
susceptibility
compatibility
upto 200V/m,



	arrestor
	landing shock; 40g rms.
▪ Weight	: 18.5kg
▪ 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

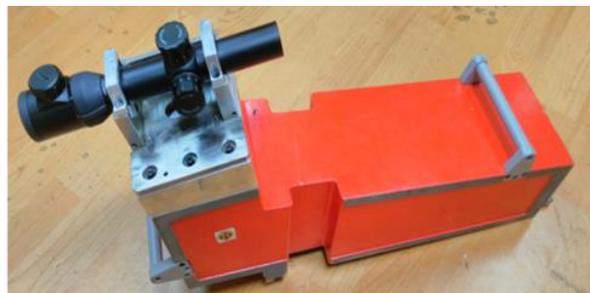
Current Status

- Design & development of Head Up Display HUD MNk1-NP and Bore Sight Equipment: Completed
- Full qualification testing as per Navy Airworthy Standards 461E, 704F and 810E: Completed.
- Four airworthy HUD MK1-NP units under flight trials and evaluations.
- Bore Sighting Equipment being used for aircraft installation purposes.

Head Up Display HUD Mk1N for Tejas Navy Aircraft



HUD MK1NP QT Unit completion of FQT testing as per MIL-STD 461E, 704F and 810E



Bore Sighting System customized for HUD Mk1-NP